Reference Hand-Book of Gynecology for Nurses

Macfarlane

Third Edition
Revised

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A REFERENCE HAND-BOOK

OF

GYNECOLOGY

FOR NURSES

BY

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THIS LITTLE BOOK
IS AFFECTIONATELY DEDICATED
TO MY MOTHER AND FIRST TEACHER,
NETTIE O. MACFARLANE

PREFACE TO THIRD EDITION

In this edition details of technic have been brought up to date and new material has been added under anatomy of the ovary, menstruation, and tumors of the uterus. Two new illustrations have been added.

Catharine Macfarlane.

Medical Arts Building,
Philadelphia, Pa.

October, 1918.

PREFACE

THIS text-book has grown out of a series of lectures on Gynecology which it is my custom to deliver each year to the nurses of the Woman's Hospital of Philadelphia.

The preparation for operation, operative technic, and post-operative treatment described in it follow the routine instituted by my chief, Dr. Caroline M. Purnell.

I am indebted to Miss Bertha M. Seldomridge and Miss Bess McCormick, surgical supervisors, for details of treatment and operating-room technic; to Mrs. Isabel Close, head nurse, for a careful revision of the manuscript; and to my friend, Dr. Mary P. S. Rupert, for helpful criticism from beginning to end.

I take this opportunity to thank my publishers, Messrs. W. B. Saunders Co., for their cordial coöperation.

CATHARINE MACFARLANE

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GYNECOLOGY FOR NURSES

ANATOMY

The Pelvis.—The pelvis (Fig. 1) is a bony girdle situated at the middle of the body in adults. It receives the weight of the trunk and transmits it to the lower extremities. In the female it serves

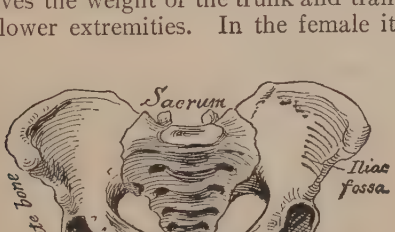

Fig. 1.—The pelvis.

also to support and protect the internal organs of generation.

Four bones compose the pelvis: two innominate bones, the sacrum, and the coccyx.

At birth each *innominate bone* (Fig. 2) consists of three separate bones, called the ilium, the ischium, and the pubis. These unite at thirteen to fifteen years to form one large irregular bone.

The *ilium* is the upper expanded portion of the innominate bone; its upper border is a thick ridge

which forms the prominence of the hip and gives attachment to the muscles of the abdominal wall. The outer surface of the ilium gives attachment to the large muscles of the buttocks. The inner surface is smooth and concave, forming the iliac fossa.

The *ischium* is the lower and posterior portion of the innominate bone. The body rests upon the tuberosities of the ischium in the sitting posture.

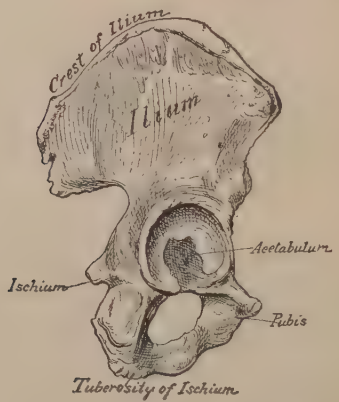

Fig. 2.—The innominate bone.

The *pubic bone* is the anterior portion of the innominate bone. The two pubic bones unite to complete the pelvis anteriorly. Their articulation is called the *pubic symphysis*.

On the outer surface of the innominate bone is a cup-shaped articular cavity, the *acetabulum*, which receives the head of the femur.

The *sacrum* (Fig. 3) is a wedge-shaped bone which completes the pelvis posteriorly. It is traversed by a central canal, which lodges the sacral nerves. These nerves pass out through openings on the anterior and posterior surfaces of

the bone. The anterior surface is smooth and concave; it is called the hollow of the sacrum. The posterior surface is rough, and presents spines and processes for the attachment of muscles and ligaments.

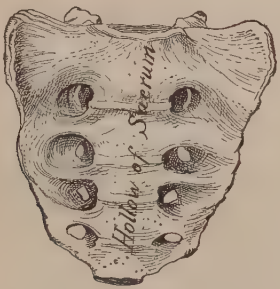

Fig. 3.—The sacrum.

On each side the bone bears a large smooth surface for articulation with the ilium. The base of the sacrum articulates with the last lumbar vertebra to form an angle called the promontory of the sacrum.

Fig. 4.—Coccyx.

In the child this bone consists of five separate vertebræ which unite at fifteen to eighteen years.

The *coccyx* (Fig. 4) is a rudimentary bone which forms the tip of the vertebral column. Injury to this bone by falls, blows, or forceps delivery may cause a very painful affection called coccygodynia. Excision of the bone is the only cure.

The Female Generative Organs.—The female generative organs are divided into three groups: the external, the internal, and the intermediate.

The external organs of generation are known collectively as the *vulva* (Fig. 5), and comprise the mons veneris, labia majora, labia minora, clitoris, vestibule, meatus urinarius, hymen, vaginal orifice, navicular fossa, and posterior commissure or fourchet.

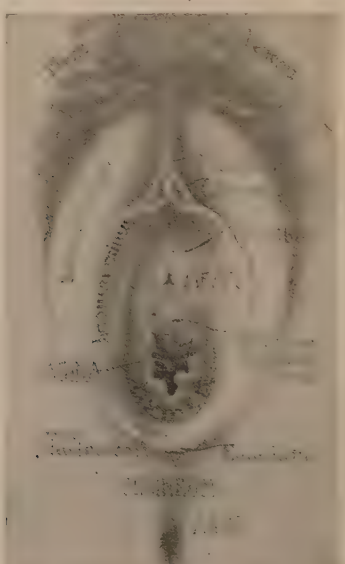

Fig. 5.—Diagram of female external genitals (Dickinson).

The *mons veneris* is a mass of fatty tissue overlying the pubic bones; it is covered with hair-clad skin, and, in the upright position, conceals the remaining structures of the vulva.

The *labia majora* are two thick folds of hair-clad skin extending from the mons veneris to the posterior commissure.

The *labia minora*, or nymphæ, are two folds of delicate skin inclosing venous plexuses; they arise, one on each side, from the inner surface of the labia majora, and meet in the median line anteriorly to form the support and covering of the clitoris.

The *clitoris* consists of erectile tissue covered with mucous membrane; it is highly sensitive, and must not be touched in manipulations about the vulva.

The *vestibule* is a triangular area of mucous membrane lying between the labia minora on each side, the clitoris in front, and the vaginal orifice posteriorly.

The *meatus urinarius*, or the external urethral orifice, is situated in the center of the vestibule.

In the virgin the *vaginal orifice* is more or less completely closed by the *hymen*, a thin fold of mucous membrane inclosing a little fibrous tissue and a few blood-vessels. The hymen may be crescentic, annular, cribriform, or imperforate. On each side of the hymen a minute orifice can be found—the external opening of the duct of the Bartholinian gland. The duct is about half an inch long, and the gland is about the size of a horse-bean; it is situated at the side of the vagina. After child-birth the hymen is converted into a few shapeless masses—the carunculæ myrtiformes.

In all manipulations about the vulva the integrity of the hymen must be carefully preserved.

The *navicular fossa* is a slight depression between the hymen and the *posterior commissure* or *fourchet*, a fold of tissue which limits the vulva posteriorly. This fossa is frequently the seat of the primary sore of syphilis, and should always be inspected before touching the vulva. That portion of the pelvic floor situated between the posterior commissure and the anus is termed the *perineum*.

The intermediate organ of generation is the *vagina*. This is a musculomembranous canal which connects the vulva with the uterus.

The walls of the vagina lie closely applied. The anterior wall is in relation with the urethra and base of the bladder; the posterior wall, with the perineal body, rectum, and peritoneum.

The mucous membrane lining the vagina is thrown into folds and is covered with many layers of squamous epithelium; it contains no glands.

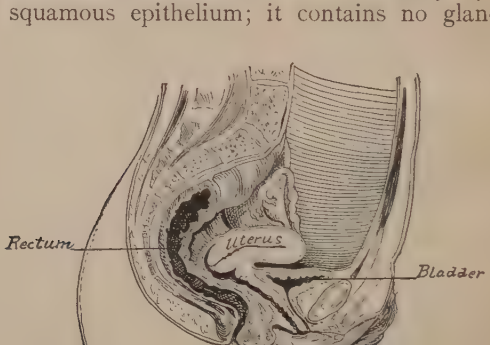

Fig. 6.—Sagittal section, showing normal position and relation of uterus, bladder, and rectum.

The vaginal secretion is acid in reaction and possesses germicidal properties. Cultures of the ordinary pus-producing organisms introduced into the vagina are soon rendered harmless.

At its upper part the vagina is attached to the neck of the uterus.

The internal organs of generation comprise the uterus, the Fallopian tubes, and the ovaries.

The *uterus* (Fig. 6) is a pear-shaped organ with

thick muscular walls inclosing a narrow cavity. In the virgin it measures three inches long, one and one-half inches wide, and one inch thick. The organ is divided by a circular depression, the isthmus, into an upper, triangular portion, the body; and a lower, spindle-shaped portion, the neck or cervix. The vagina is attached to the cervix a little below the isthmus.

The anterior surface of the uterus rests upon the bladder. The upper border, which is broad and thick, is called the fundus. The junction of each lateral border with the fundus is called a cornu.

At the lower angle of the uterus is the external uterine orifice. In the virgin this is a narrow, transverse slit; after child-birth it becomes circular or, if torn, gives rise to lateral, bilateral, or stellate lacerations of the cervix.

Internally the cavity of the uterus is divided, on a level with the isthmus, into an upper, triangular portion, the cavity of the body, and a lower cylindric portion, the cervical canal. The cavity of the body communicates with the cervical canal through the internal uterine orifice; it communicates with the cavity of the Fallopian tubes through a small orifice in each cornu.

The mucous membrane lining the cavity is thick and vascular; it contains numerous glands which secrete an alkaline mucus. The muscular coat of the uterus is very thick and vascular.

The uterus is held in position by ligaments; these are folds of peritoneum inclosing some muscular and fibrous tissue. The broad ligaments extend from the sides of the uterus to the pelvic wall; the round ligaments, from the cornua to the internal abdominal rings; the uterosacral ligaments, from the cervix to the hollow of the sacrum; and the uterovesical ligaments, from the cervix to the symphysis pubis.

The *oviducts* or *Fallopian tubes* (Fig. 7) are two in number, and extend from the cornua of the uterus along the upper border of the broad ligaments.

Each oviduct is from four to five inches long, and commences as a narrow straight tube, called the isthmus; this passes into a wider and tortuous portion, the ampulla, which finally expands into

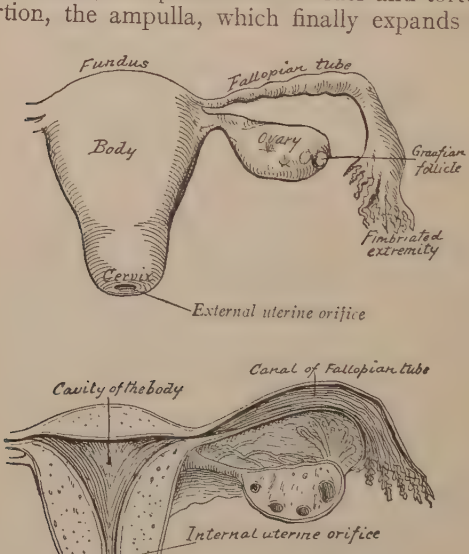

Fig 7.—The uterus, ovary, and Fallopian tube.

the dilated infundibulum, a trumpet-shaped orifice surrounded by finger-like processes called fimbriæ. The oviduct contains a canal lined with mucous membrane.

The *ovaries*, two in number, are almond-shaped bodies attached to the posterior surface of the broad ligaments. They contain innumerable ova, each one surrounded by a more or less well-developed cellular envelop, which is called a Graafian follicle when mature. The follicle projects upon the outer surface of the ovary, and,

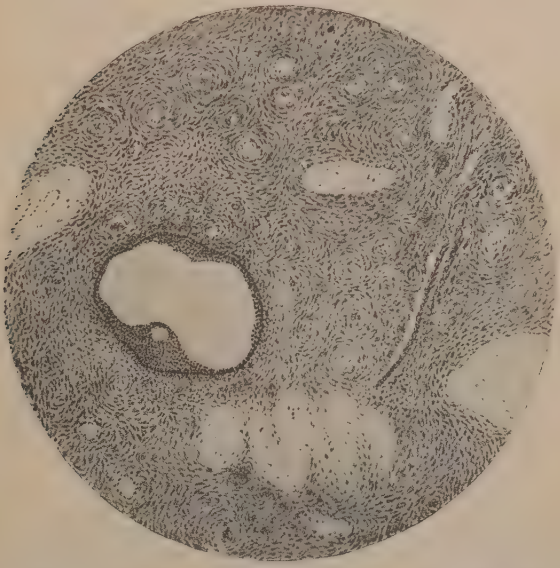

Fig. 8.—Graafian follicle as it appears in the surrounding ovarian tissue. Just below the follicle is a corpus albicans (Graves).

when ripe, ruptures and discharges the ovum into the Fallopian tube.

After escape of the ovum, blood accumulates in the center of the ruptured follicle, forming the so-called "corpus hemorrhagicum." The blood coagulates and the resulting clot is surrounded and invaded by a rapid growth of cells containing drops of fat and yellow pigment granules—these

are called lutein cells. The resulting yellow body or "corpus luteum" has a distinctly glandular structure and is believed to be a true gland with an important secretion which is discharged directly into the circulating blood which bathes its cells—a gland of internal secretion in other words. If pregnancy occurs, the yellow body continues to enlarge for about two months and is believed to exert an important influence over the attachment of the ovum to the uterine wall. If pregnancy does not occur the yellow body reaches its highest development in about two weeks, then gradually degenerates into a white scar or "corpus albicans."

PHYSIOLOGY AND HYGIENE

The functions of the female generative organs are ovulation, menstruation, conception, pregnancy, and parturition.

Ovulation is the ripening and discharge of ova. At birth each ovary contains from 30,000 to 40,000 ova. The liberation of ova usually coincides with the menstrual periods, although the process is continuous throughout the child-bearing period.

Menstruation is a discharge of blood from the genitalia recurring periodically from puberty until the menopause, except during pregnancy and lactation. As a rule, the flow occurs every twenty-eight days and lasts five to seven days. The discharge comes from the mucous membrane lining the uterus, and consists of blood mixed with mucus; about 2 ounces are lost during the average period. During the twenty-eight-day menstrual cycle the mucous membrane lining the uterus—the endometrium as it is called—undergoes a series of changes classified into four stages: 1. Premenstrual. 2. Menstrual. 3. Postmenstrual. 4. Interval.

The age at which menstruation is established is called the *age of puberty;* it averages about fourteen years in this country, and coincides with the first regular liberation of ova. The changes of puberty include the development of the pelvic bones, reproductive organs, and breasts; the growth of pubic and axillary hair; general rounding out of the body and maturing of the nervous system. As these changes are completed the girl develops into a woman and the child-bearing age is reached.

The period of cessation of menstruation is called *the menopause;* this occurs usually between forty and fifty years, and may be abrupt or gradual; the underlying cause is the cessation of ovarian activity. The menopause is attended by atrophy of the pelvic organs and breasts, and by nervous phenomena, such as headaches and "flashes of heat." At this period malignant degeneration —cancer—is prone to develop in the uterus and breasts.

Hygiene.—*The Hygiene of Puberty.*—A perfectly healthy girl, who menstruates regularly and painlessly, requires no special oversight. She should be warned against exposure to cold and wet. Excessive exercise, dancing, golf, tennis, bicycling, and horseback riding during the period should be forbidden.

A girl who menstruates too frequently, excessively, or with pain, must rest in bed for the first three days of her period or throughout the entire flow, and should seek medical advice to correct the underlying cause of her symptoms.

The Hygiene of Maturity.—The menstruating woman should guard against exposure; should avoid heavy work or lifting; and should keep off her feet as much as possible during the first three days of the flow.

The Hygiene of the Menopause.—The danger of malignant degeneration at this period is great, and its development most insidious. Hence every woman who notices "lumps" in her breast should be alert to consult her physician; while irregular or excessive bleeding from the uterus, or a return of bleeding after complete cessation, is a serious symptom and calls for immediate pelvic examination.

Every woman who has borne children should be examined after the child-bearing period. If

lacerations of the cervix are discovered, they should be repaired, because they predispose to cancer.

The ideal treatment for the nervous symptoms of the menopause is an outdoor life, with rest and freedom from responsibility.

THE DISORDERS OF MENSTRUATION

Amenorrhea is the absence of the menstrual flow during the period of sexual maturity. It is caused by exposure to cold and wet; acute infectious diseases; some chronic wasting disorders, such as tuberculosis, nephritis, and anemia; poor development and premature atrophy of the pelvic organs. Physiologic amenorrhea occurs during pregnancy and lactation.

Dysmenorrhea is painful menstruation. It may result from lack of development of the pelvic organs or from some diseased condition thereof, such as inflammation or tumors. It may also be a symptom of hysteria or neurasthenia.

Menorrhagia is excessive uterine bleeding at the regular period. *Metrorrhagia* is excessive bleeding between the periods.

The causes of menorrhagia and metrorrhagia are incomplete abortion, pelvic congestion or inflammation, tumors of the uterus, diseases of the blood, systemic poisons, sclerosis of the uterine arteries, and valvular heart disease.

THE GYNECOLOGIC EXAMINATION

Prepare for the physician a basin of hot water, nail-brush, and soap; a basin of bichlorid solution 1 : 10,000; a pair of sterile rubber gloves; sterile white vaselin or glycerin as a lubricant.

Instruments required (Fig. 9):

Two bivalve specula (one virgin size).
Sims speculum.
Weight speculum.
Vaginal retractor.
Tenaculum forceps.

Uterine sound.
Bladder sound or catheter.
Dressing forceps.
Applicators.

Boil the instruments in soda solution for five minutes, lift them out into an instrument tray, and cover with a sterile towel. If the physician so desires, pour hot sterile water over the instruments when they are to be used. Never let the patient see the instruments.

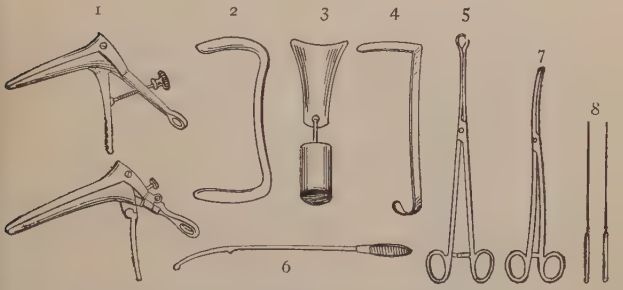

Fig. 9.—Instruments required for gynecologic examination: 1, Bivalve specula; 2, Sims's speculum; 3, weight speculum; 4, vaginal retractor; 5, tenaculum forceps; 6, uterine sound; 7, dressing forceps; 8, applicators.

Supplies.—Have ready in suitable receptacles the following supplies (Fig. 10):

Tampons of non-absorbent cotton or wool.
Cotton balls.
Cotton-wound applicators.

How to Make a Vaginal Tampon.—Take a thin layer of cotton or wool about eight inches long and three and a half inches wide, fold over each long edge to the center. Fold one end down to meet the other end, and tie a piece of linen thread, six inches long, around all layers of the tampon, about half an inch from the cut end.

Prepare tampons of different widths and lengths; thick tampons are not desirable.

Preparation of the Patient.—*Clothing.*—In office practice, tell the patient to remove her hat and coat, loosen all bands about the waist, and to take off her corset. Closed drawers must be taken off.

If the patient is in bed, provide a pair of drawers and stockings for her to wear in addition to her gown.

Bowels.—The patient's bowels must be thoroughly emptied by a low soap-suds enema, given at least one hour before the examination.

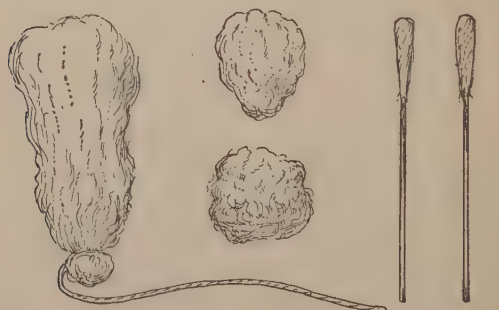

Fig. 10.—Tampon, cotton balls, and cotton-wound applicators.

Bladder.—Direct the patient to empty her bladder immediately before the examination.

Cleansing and Disinfection.—Wash off the vulva and perineum with warm water and soap, and give a cleansing vaginal douche of salt or boric-acid solution before the examination.

If an extensive examination is planned, including passing the uterine or bladder sound, disinfect the vulva with bichlorid solution 1 : 10,000 after the soap-and-water cleansing, and give a bichlorid vaginal douche.

In some cases the physician may prefer to examine the patient without preliminary cleansing or disinfection, in order to determine the presence and character of certain discharges.

Preparation of the Table.—Pelvic examinations are usually made upon a gynecologic treatment table.

For the examination the nurse must provide two pillows and two sheets. Cover the table with one sheet, place one or more pillows for the patient's head, and drape the second sheet over the patient's body to prevent unnecessary exposure.

Fig. 11.—Patient in the dorsal position, lengthwise in the bed (Ashton).

Treatment table sheets measure one yard wide by two yards long. An ordinary kitchen table provided with adjustable foot-rests or stirrups may serve instead of a complicated treatment table.

Preparation of the Bed.—If the patient is to be examined in bed, provide an extra sheet and a suitable board that will support the patient and prevent her hips from sagging down into the mattress. In private houses a lap-board, the leaf of a dining-table, or an ironing-board serves the purpose.

The patient may be examined lying either lengthwise or crosswise of the bed.

The *lengthwise position* is used only when the patient is too ill to be disturbed; instruments cannot be used in this position, and it is available only for inspection of the vulva and for digital examination.

To prepare for examination in this position slip the board between the mattress and the wire spring at right angles to the side rail of the bed; draw up the patient's knees and separate them widely; flex her thighs and legs, and place her feet at the edge of the board, about twelve inches apart (Fig. 11). Turn the bed-clothes back

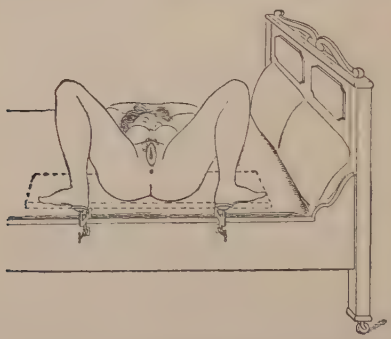

Fig. 12.—Patient in the dorsal position, crosswise in the bed (Ashton).

neatly and drape a sheet over the patient's body and knees, arranging it so as to expose the vulva.

The Cross-bed Position (Fig. 12).—To prepare for examination in this position slip the board under the mattress lengthwise of the bed and close to the side rail. Place the patient across the bed with her head on pillows, her hips on the board, her knees drawn up and widely separated, and her feet on foot-rests or on two chairs placed eighteen inches apart, touching the side rail of the bed.

THE GYNECOLOGIC POSITIONS

The following positions are used in gynecologic examination and treatment:

Standing position.
Dorsal position.
Elevated dorsal position.
Lithotomy position.
Knee-chest, knee-breast, or genupectoral position.
Sims's or left lateroprone position.
Horizontal recumbent position.
Trendelenburg position.

Fig. 13.—Standing position (Ashton).

Standing Position (Fig. 13).—In this position the patient stands near a chair or table, with one foot on the floor and the other resting on a stool

or on the round of a chair, six or eight inches from the floor. She steadies herself by resting one hand upon the table or chair-back.

Roll the patient's skirts up in front and pin them at the waist-line in the back. Pin a sheet around the patient's waist, reaching to the floor and opening at one side.

Dorsal Position (Fig. 14).—In this position the patient lies on her back, with her hips at the edge of the table and her feet resting upon foot-rests; her thighs are flexed upon the abdomen and her legs upon the thighs.

Fig. 14.—Dorsal position (Ashton).

Tell the patient to raise her skirts in the back before sitting down upon the table. After she is in position throw a sheet over her lower extremities and abdomen. Grasp with both hands the lower edge of the patient's skirts in front, gather them up into folds, and carry them above her knees.

Fold the lower edge of the sheet between her thighs to expose the vulva, and drape one end across to the opposite knee to prevent exposure until the examiner is ready to proceed.

Elevated Dorsal Position.—This position resembles the preceding except that the patient's

head and shoulders are elevated on several pillows.

Lithotomy Position (Fig. 15).—This position is similar to the dorsal position except that the

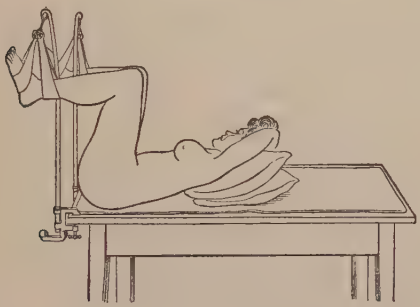

Fig. 15.—Lithotomy position (Ashton).

patient's feet rest in stirrups about eighteen inches above the level of the table.

Knee-chest Position (Fig. 16).—In this position the patient kneels on the table, near one

Fig. 16.—Knee-chest position (Ashton).

end, with her knees slightly separated, her feet projecting over the edge of the table, and her thighs vertical. Her face is turned on one side and rests upon a soft pillow. The patient touches the table with her breasts and knees and grasps

the sides of the table with her hands. A folded pillow may be placed under her chest for support.

Throw a sheet over the patient's hips, push the skirts up beyond the hips, and separate the sheet to expose the gluteal cleft.

Sims's Position.—In this position (Fig. 17) the patient lies on her left side with the left hip at

Fig. 17.—Sims's position (Penrose).

the edge of the table and her left arm behind her. Both knees are drawn up toward her chest; the right knee rests upon the table in front of the left knee. Drape a sheet over the patient's lower limbs and abdomen, push the clothing up above the hips, and separate the edges of the sheet to expose the gluteal cleft.

Fig. 18.—Horizontal recumbent position (Ashton).

Horizontal Recumbent Position.—In this position (Fig. 18) the patient lies flat upon her back, with her head resting upon a pillow, her arms alongside the body, legs extended, and heels in contact.

Push the patient's clothing well below the hips, both back and front, and cover her lower limbs with a folded sheet. Push the clothing of the upper part of the body well above the waist-line, fold a second sheet and lay it across the chest and arms. The surface of the abdomen is exposed to view.

Trendelenburg Position.—In this position (Fig. 19) the patient lies flat upon her back upon

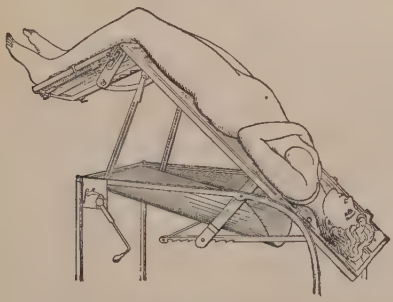

Fig. 19.—Trendelenburg position (Ashton).

an inclined plane in such a way that her knees are at the highest point and her feet hang over the edge of the plane.

Arrange the clothing and sheets as in the preceding position.

DOUCHES

A douche is a stream of water directed against a part or used to flush a cavity of the body. Vaginal and intra-uterine douches are used in gynecology.

Vaginal Douches.—Vaginal douches are given for various purposes—cleansing, disinfection, depletion, to allay irritation, to shrink relaxed tissues, and to arrest hemorrhage.

Articles Needed.—A receptacle for the solution—this may be of glass, agateware, or rubber. In domestic practice the two-quart rubber douche-bag or fountain-syringe is generally used (Fig. 20).

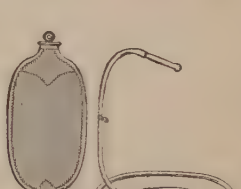

Fig. 20.—Rubber douche-bag, tubing, and nozzle.

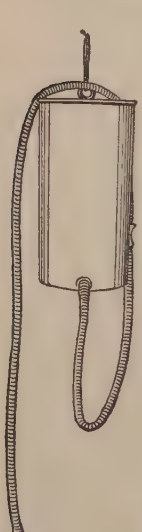

Fig. 21.—Enamelware douche reservoir, rubber tubing with clamp, and glass vaginal nozzle.

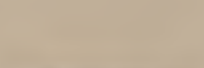

Fig. 22.—Douche-pan.

Fig. 23.—Kelly pad.

A piece of rubber tubing, four to six feet long and provided with a clamp, is attached to this receptacle. Vaginal nozzles of glass or hard rubber, curved or straight (Fig. 21). These must have openings at the sides and not at the tip, to prevent the entrance of fluid into the cavity of the uterus.

Preparation for a Vaginal Douche.—Boil the

nozzle in soda solution for five minutes, then place in a sterile pan until required.

Mix the prescribed solution in a pitcher at the proper temperature.

Place the patient in the dorsal position on a bed or table, with her hips resting upon a douche-pan (Fig. 22), Kelly pad (Fig. 23), or bed-pan, and properly covered with a sheet. A douche taken in the sitting posture is useless, because the fluid does not reach the upper part of the vagina.

Method of Giving a Vaginal Douche.—Hang the douche-bag with its attached tubing from a nail or clothes-tree two feet above the level of the patient's hips, clamp the tubing, and fill the bag with the solution to be used at the proper temperature. After washing and disinfecting your hands, attach the nozzle to the tubing, being careful not to handle the end which is to be inserted into the vagina nor to let this come in contact with anything. Open the clamp and let the solution run through the tubing and nozzle until it comes warm; separate the labia with the thumb and forefinger of one hand; with the other hand carefully introduce the nozzle into the vagina for two or three inches; direct the tip toward the hollow of the sacrum and let the solution flow.

There must be a good return flow from the vagina. To secure this it may be necessary to press the nozzle against one side of the vaginal orifice or posteriorly. After all the solution has run through, pinch the tubing; withdraw the nozzle and direct the patient to expel the fluid from the vagina by straining; then remove the douche-pan.

In order to derive proper benefit the patient should remain in the recumbent posture for one hour after a hot douche.

Boil the nozzle in soda solution for five minutes

after using, and similarly disinfect the douche receptacle and tubing after an infectious case.

Solutions Used.—Cleansing Douches.—Sterile water, normal salt solution, borax solution (teaspoonful to quart) given at 110° F.

Disinfecting Douches.—Boric acid, teaspoonful to quart; potassium permanganate, 1 : 4000; bichlorid of mercury, 1 : 8000; creolin, teaspoonful to quart; lysol, teaspoonful to pint; carbolic acid, one teaspoonful in a tablespoonful of glycerin to the quart of water. Carbolic acid is insolubie in water and, unless mixed with glycerin, may float upon the surface of the douche and seriously burn the patient. Give at 110° F.

Depleting Douches.—Prolonged, hot vaginal douches, by reason of their secondary astringent action, produce depletion of all the pelvic organs. To obtain this effect a four- to eight-quart douche of sterile water or salt solution must be given every four hours, keeping the temperature of the solution at 110° to 115° F. throughout the flow.

Emollient Douches.—Witch-hazel, one part to five of water. Give one quart at 110° F.

Astringent Douches.—Alum or zinc sulphate, one teaspoonful to the quart.

To arrest hemorrhage, vaginal douches of salt solution or sterile water are given at 118° to 120° F.

These hot solutions stimulate contraction of the uterus and of the blood-vessels.

Intra-uterine Douches.—Intra-uterine douches are always given by the physician. They serve to remove débris from the cavity of the uterus, to disinfect the uterus, and to arrest hemorrhage from it.

A disinfecting vaginal douche must precede every intra-uterine douche.

Articles required:

Kelly pad.

Weight speculum.

Vaginal retractor.
Tenaculum forceps.
Douche-bag and tubing.
Vaginal nozzle.
Intra-uterine nozzle (Fig. 24).

Preparation for an Intra-uterine Douche.—Sterilize the above-mentioned articles, with the exception of the Kelly pad, by boiling for ten minutes in soda solution. Lift the instruments into a sterile tray, cover with a sterile towel, and place on a table beside the bed. Pour hot sterile water over the instruments before using.

Make ready for the physician hot water, nail-brush, soap, a basin of bichlorid solution, and a pair of sterile rubber gloves.

Place the patient in the dorsal position upon a table or across the bed, with her hips drawn well over the edge and resting upon a Kelly pad.

Fig. 24.—Intra-uterine nozzle.

Wash the vulva with soap and water and disinfect with bichlorid solution.

Hang the douche-bag eighteen inches above the level of the patient's hips, so that the solution cannot be forced through the uterine orifices into the Fallopian tubes.

The douche-bag is first filled with the solution

to be used for the disinfecting vaginal douche; after this has been given, with the solution ordered for the intra-uterine douche.

The simple, cleansing, intra-uterine douche is used most frequently during curettage, to wash away fragments of mucous membrane or placental tissue as they are loosened by the curet. Sterile water or salt solution is used at 115° F.

Disinfecting intra-uterine douches are given after septic abortion or for septic endometritis. Alcohol and solutions of boric acid, lysol, or creolin are used.

To arrest hemorrhage after curettage, abortion, or delivery at term, there is nothing better than the intra-uterine douche of salt solution or sterile water at 120° F.

GYNECOLOGIC DISEASES

DISEASES OF THE VULVA

Vulvitis is an inflammation of the vulva.

Catarrhal vulvitis is caused by mechanical irritation, uncleanliness, irritating urine or discharges. The symptoms are burning pain, swelling, and increased secretion.

Gonorrheal vulvitis results from infection by the gonococcus. The symptoms are similar to those of the catarrhal form, but more severe. The

Fig. 25.—Abscess of the vulvovaginal gland in gonorrhea (Wilson).

inflammation is prone to extend to the urethral mucous membrane, causing urethritis, with symptoms of frequent and painful micturition. It may also extend along the ducts of the vulvovaginal or Bartholin's glands, resulting in an abscess or suppurating cyst of one or the other gland.

The symptoms of vulvovaginal abscess (Fig. 25), or abscess of the vulvovaginal gland, are acute

throbbing pain, swelling of one labium, mechanical interference with walking or standing. The treatment is surgical.

If left to themselves, these abscesses open spontaneously in time; usually the opening is so small that drainage is imperfect and pus reaccumulates at intervals. The opposite gland becomes infected eventually, and the process drags out a weary length until the virulence of the germs is exhausted.

Vulvovaginitis—a gonorrheal inflammation of the vulva and vagina may occur in female infants or little girls. This disease is caused by indirect infection through towels, diapers, thermometers, or the hands of attendants. It may be acute or chronic, and is frequently epidemic in babies' hospitals, orphans' homes, and similar institutions; only microscopic cleanliness will arrest its spread.

Eczema Vulvæ.—This is the commonest skin disease of the vulva. It results from uncleanliness, irritating discharges, diabetic or highly acid urine.

Pruritus vulvæ, itching of the vulva, is a symptom of eczema and vulvitis.

Adhesions between the clitoris and the folds of mucous membrane covering it, or an accumulation of smegma in this location may give rise to severe local irritation and to marked reflex nervous disturbances.

Urethral caruncle is the most frequent new-growth of the vulva. It is a small, bright-red growth, exquisitely sensitive, attached to the posterior margin of the meatus urinarius. These tiny growths cause great pain and deplorable nervousness. The treatment is surgical.

Papillomata—warts—of the vulva are frequent.

Fibromata (fibroid tumors), *lipomata* (fatty tumors), *carcinomata* and *sarcomata* (malignant tumors), are rare.

Chancroid is an infectious ulcer of the vulva.

Chancre, mucous patches, condylomata, and *gummata* are the various manifestations of syphilis occurring on the vulva.

The nurse must be alert to detect suspicious lesions, and must guard against infecting herself or carrying infection to other patients by wearing rubber gloves when treating infectious cases, and by careful disinfection of hands, nozzles, instruments, Kelly pads, and douche-pans between patients.

LACERATIONS OF THE PERINEUM

Perineal lacerations occur during child-birth and are classed as complete and incomplete. Complete lacerations are those extending through the sphincter ani; they are followed by loss of control of this muscle and consequent incontinence of feces and gas.

All lacerations predispose to descent of the vagina and uterus.

DISEASES OF THE VAGINA

Vaginitis is an inflammation of the vagina.

Catarrhal vaginitis is caused by the mechanical irritation of pessaries or wool tampons.

Infectious vaginitis is rare, owing to the protective action of the acid vaginal secretion. It is most apt to occur in children or in pregnant women, because of the greater delicacy of the mucous membrane in such patients.

In old women a desquamative form of vaginitis is of frequent occurrence. This results in the formation of adhesions and more or less atresia of the vaginal canal.

The symptoms of vaginitis are burning and increased secretion. The treatment consists in rest, douching, and local applications.

Congenital atresia or obstruction of the vagina is usually discovered at puberty.

The menstrual flow does not appear at the usual age; instead, there is a monthly recurrence of headache and lassitude, without any flow. Eventually a fluctuating tumor appears above the symphysis, which consists of the vagina and uterus distended with menstrual blood.

The cause of the obstruction is usually an imperforate hymen; in some cases there is an anomalous septum across the upper part of the vagina.

The treatment of this condition is surgical, and consists in puncture or excision of the obstructing membrane.

Vaginismus is a spasm of the muscles surrounding the vaginal orifice; it interferes with examination or treatment, and may be a cause of sterility.

Most cases can be cured by gradual dilatation with glass vaginal dilators.

Cysts and *solid tumors* of the vagina are rare.

Cystocele is a downward displacement of the bladder and anterior vaginal wall.

Rectocele is a downward displacement of the rectum and posterior vaginal wall.

Cystocele and rectocele are caused by tears during child-birth and require operation for their cure.

DISEASES OF THE UTERUS

Injuries and Diseases of the Cervix.—*Cervical lacerations* occur during child-birth; they are described as lateral, bilateral, or stellate. They frequently lead to inflammation of the uterus, and are the commonest known cause of cancer of the cervix.

These tears may be repaired immediately after delivery or at any time subsequently. They should always be repaired at the end of the child-

bearing period, because of the danger of malignant degeneration at this time.

Endocervicitis is an inflammation of the cervical mucous membrane. It is frequently of gonorrheal origin; the chief symptom is leukorrhea.

The treatment consists in local applications, Bier's hyperemia, cauterization, or curettage.

Cervical polypi are benign growths derived from hypertrophy of the mucous membrane lining the cervix. They are usually pedunculated, and are prone to bleed upon touch. The treatment is surgical.

Cancer of the cervix will be considered together with cancer of the body of the uterus.

Diseases of the Body of the Uterus.—*Endometritis* is an inflammation of the mucous membrane lining the body of the uterus. It may be secondary to displacements of the uterus, or may be of infectious origin.

Metritis is an inflammation of the whole substance of the uterus.

The symptoms of endometritis and metritis are increased discharge, profuse menstruation, pelvic pain, and tenderness.

Displacements of the Uterus.—The normal position of the uterus is moderate *anteversion*. (See Fig. 6.) In *anteflexion* the body is bent forward sharply upon the cervix to form an angle. Undeveloped uteri are usually anteflexed; the symptoms of anteflexion are dysmenorrhea and sterility.

In *retroversion* the whole organ is turned slightly toward the hollow of the sacrum.

In *retroflexion* (Fig. 26) the body is bent back sharply on the cervix.

The symptoms of backward displacements are backache, leukorrhea, dysmenorrhea, menorrhagia, sterility, or repeated abortions.

Prolapsus uteri is descent of the uterus below

its normal level in the pelvis. The causes of prolapse are falls, excessive burden bearing, instrumental delivery, and perineal lacerations. In complete prolapse, or *procidentia*, the uterus appears outside of the vaginal orifice.

Tumors of the Uterus.—The uterus is more commonly the seat of new growths than any other organ in the body, 25 per cent. of all tumors being found in it. These tumors are benign or malignant and may arise from the muscular and connective-tissue elements of the uterus, from its

Fig. 26.—Retroflexion of the uterus (Ashton).

lining epithelium, or from retained fetal cells. In order of frequency these tumors are classified as follows: fibromyomata, carcinomata, adenofibromata, chorioepitheliomata, and sarcomata.

Fibroid tumors of the uterus, or fibromyomata (Fig. 27), are growths derived from hypertrophy of the normal fibrous and muscular tissue of the organ.

These tumors may develop beneath the mucous membrane lining the uterus, and project into the uterine cavity, where they are called submucous fibromyomata. They may develop on the sur-

face of the uterus, and grow toward the peritoneal cavity—subserous fibromyomata; or they may develop in the muscular wall of the uterus and produce a general enlargement of the organ without projecting nodules—interstitial fibromyomata.

The symptoms of submucous fibromyomata are enlargement of the uterus, hemorrhage at or between the periods, leukorrhea, and dysmenorrhea. Interstitial fibromyomata also cause hemorrhage. The subperitoneal forms do not cause

Fig. 27.—Fibroid tumor of the uterus.

hemorrhage, but attract attention by increased size and pressure symptoms.

The cause of fibroid tumors is unknown; according to the latest theory, they are of congenital origin. They rarely produce symptoms before thirty years of age. Some of these tumors grow to a great size; they may complicate delivery, and usually delay the occurrence of the menopause; a small percentage undergo malignant degeneration. Large tumors or tumors of any size producing pressure symptoms should be re-

moved by operation. Bleeding tumors in patients under forty-five should be operated upon, the ovaries being saved, if healthy, to avoid a precipitate menopause. Bleeding tumors in patients over forty-five may be removed by operation, or may be treated by the *x*-ray or radium.

Cancer of the Uterus.—This is a malignant growth originating in the epithelium lining the cavity of the fundus or cervix as the case may be. Appearing first as a delicate finger-like outgrowth, the disease progresses by infiltration, proliferation, and ulceration until the uterus is converted into a thin-walled sac, containing friable masses of broken-down tissue. Extension of the disease into the broad ligaments converts the latter into densely infiltrated masses of almost stony hardness. In advanced cases the pelvic and abdominal lymphatic glands are enlarged.

Cancerous growths of the uterus are classified according to their location and histologic structure. The most frequent forms are the following:

Squamous-celled carcinoma of the cervix.

Adenocarcinoma of the cervix.

Adenocarcinoma of the body.

The two first-mentioned varieties are commonly known as cauliflower growths of the cervix.

The symptoms of this disease are bleeding, watery or purulent discharge, pain, emaciation, cachexia, anemia, and fever. Almost invariably the first symptom is bleeding, particularly irregular bleeding, for example, between periods or after the menopause; bleeding following intercourse or straining at stool, after douching, or unusual exercise. The quantity of blood lost may be so slight that it appears only as a stain upon the clothing, but its significance cannot be overestimated. As the disease advances, bleeding becomes more profuse, and there may be a

constant bloody discharge, with severe hemorrhages from time to time. The other symptoms appear at a later and frequently inoperative stage of the disease.

From the standpoint of gynecology, cancer of the uterus is the most important medical subject of the day, and for the following reasons:

(1) Its frequency.

(2) Its increasing frequency.

(3) Its curability by early operation.

Its Frequency.—Out of every 100 deaths among women, 12 are from cancer, and of these, 4 from cancer of the uterus. In other words, more women die from cancer than from tuberculosis (100 as against 95 in 1905). Cancer of the uterus attacks women of every age, married or single, white or black, but occurs most frequently in women of forty years and over who have borne children. Lacerations of the cervix, such as occur in child-birth, predispose to the cancerous change.

Its Increasing Frequency.—All over the world deaths from cancer are steadily increasing. While in 1859, 480 women died in England from cancer, in 1908, 1010 women died from this disease. This increase is shown in graphic manner by the accompanying chart (Fig. 28).

Without doubt this steady increase is due to the fact that *the cause of cancer is unknown.* When we know what it is that enters into the human body and produces this spreading loathsome growth, then we shall be in a position to destroy this cause and the death-rate from cancer will begin to decline, just as the tuberculosis death-rate has declined since the discovery of the tubercle bacillus. Throughout the world physicians, scientists, and laymen are laboring to discover this elusive cause; whoever finally succeeds will be one of the greatest benefactors of our race.

Its Curability.—At present the one hopeful fact about cancer is this, at its beginning it is a purely local disease, and, if discovered and removed in this early stage, can positively be cured. The problem confronting the gynecologist today is, How can we reach women with cancer of the uterus in this early and curable stage? The answer to this question lies in a campaign of education which will reach every woman in every land, and establish our present-day knowledge of the

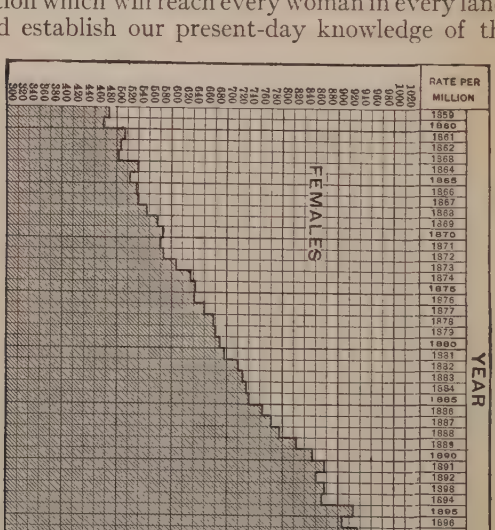

Fig. 28.—Table showing increase of cancer in England from report of Registrar General, 1908.

subject as a well-known household fact. No one is in a better position to serve in this crusade against cancer than an able and sympathetic nurse, who, while approaching this delicate sub-

ject tactfully, can yet speak with the authority which commands attention.

Summing up the facts contained in the preceding paragraphs, the following rules for the prevention of cancer may be laid down:

Every woman who has a discharge of blood between periods should consult a physician.

Every woman who flows excessively at the regular period should consult a physician.

Every woman whose womb has been torn in childbirth or abortion should have these tears repaired before the age of forty-five.

Every woman who wears a ring or pessary should have this removed at intervals by a physician, who will detect ulceration if present.

Every woman who has passed the menopause and who notices a bloody discharge, however slight, should be examined by a physician at once.

In the treatment of cancer of the uterus, surgery, radiotherapy, and cauterization are the principal methods to be considered.

Cure by operation is possible only at an early stage while the disease is confined to the uterus or has but slightly invaded the parametrium and local lymph-glands. At this stage an extensive abdominal panhysterectomy after the Wertheim method is the operation of choice.

For inoperable cases radium is the treatment of choice; under its application some of these cases are cured; others are symptomatically relieved, bleeding, discharge and pain disappearing as the cancerous mass heals; still others are unimproved.

In advanced cases, where radium is not available, temporary relief may be obtained by removing the cancerous masses by the curet and cauterizing the raw surface by the actual cautery; it is in these cases that Percy's method of applying heat is indicated.

DISEASES OF THE FALLOPIAN TUBES

Salpingitis is an inflammation of the Fallopian tube and may be catarrhal or purulent.

Catarrhal salpingitis results from exposure to cold and wet, or may be secondary to displacements or fibroid tumors of the uterus.

Purulent salpingitis results from infection by micro-organisms, for example, the gonococcus, streptococcus, or staphylococcus. It is usually secondary to a similar infection of the endometrium. Tubercular salpingitis may be primary or secondary to tuberculosis of the peritoneum. These forms of inflammation lead to occlusion of the orifices of the tube, with the formation of a closed sac containing pus—a pyosalpinx.

Hemorrhage into an occluded tube gives rise to a hematosalpinx; hydrosalpinx is a tube distended with serum; this is usually the sequel of a pyosalpinx after the germs have died and the pus has been converted into serum.

Tubal Pregnancy.—Tubal pregnancy is one of the gravest gynecologic diseases. In this form of pregnancy the fertilized ovum does not reach

Fig. 29.—Ruptured ectopic pregnancy.

the cavity of the uterus, but lodges in some portion of the Fallopian tube and develops there. The growth of the ovum soon exceeds the stretching power of the tube, and it escapes by rupture of

the tube (Fig. 29) or by abortion through the fimbriated extremity.

The symptoms of rupture are agonizing pain in the corresponding ovarian region, syncope, feeble frequent pulse, subnormal temperature, and pinched features. These symptoms result from hemorrhage, shock, and mechanical injury.

The patient may die from the first hemorrhage, but usually rallies and symptoms of rupture recur from time to time upon exertion or spontaneously.

If left alone, the mortality is 70 per cent. The chief causes of death are hemorrhage and peritonitis.

The treatment is surgical and consists in removal of the ovum and ruptured tube. While preparing for operation the symptoms of shock must be actively combatted.

Fig. 30.—Ovarian cyst.

DISEASES OF THE OVARIES

Oöphoritis is an inflammation of the ovary. It may follow exposure to cold and wet and frequently results from infection ascending through the uterus and Fallopian tubes. Occasionally the infection may originate in a remote focus, *e. g.*, the tonsils.

The symptoms are pain and tenderness in the ovarian region, dysmenorrhea, sometimes excessive menstrual flow.

The treatment is palliative or surgical. The palliative treatment consists in rest, hot douches, and local applications of iodin and ichthyol.

Solid tumors of the ovaries are rare.

Ovarian cysts (Fig. 30) may result from the accumulation of fluid in a normal follicle—a *follicular cyst;* in the follicle after rupture—*corpus luteum cyst;* or may be a form of new-growth in which there is active proliferation of normal follicles with enormous increase in their size; these growths are termed *proliferating glandular cysts* or *papillary cystadenomata* if they contain solid masses also.

Dermoid cysts are curious tumors, partly solid and partly cystic. They contain a heterogeneous collection of structures, such as hair, skin, teeth, bones, etc. The cause of these tumors is unknown; they are not peculiar to the ovary.

The treatment of cysts and solid tumors of the ovary is surgical.

PELVIC ABSCESS

A pelvic abscess is a circumscribed collection of pus in the pelvis. It is caused by infection by the staphylococcus, streptococcus, bacillus coli communis, gonococcus, etc.

The pus may be in the ovary—*ovarian abscess;* in the Fallopian tube—*pyosalpinx;* or the ovary and tube may together form the pus-sac—*tubo-ovarian abscess*. It may be in the pockets of the pelvic peritoneum, walled off from the general abdominal cavity by densely adherent intestines, or it may be in the cellular tissue between the folds of the broad ligaments or in front of or behind the uterus.

The early symptoms of pelvic suppuration are those of an acute infection—localized pain and tenderness, high fever, rapid pulse, chills, sweats, prostration. These symptoms may last for days

and weeks, and during this period the defenses of the body are at work, destroying germs, neutralizing poisons, and encapsulating the irritant by means of adhesive inflammation.

When the inflammatory reaction is complete, the general symptoms subside and the patient is left emaciated and exhausted, with an encysted collection of pus somewhere in the pelvis. The symptoms of the next stage are due to the pressure of this mass.

In some cases the result is more tragic. The defenses of the body may prove inadequate, and death may result from general infection within a few days; or the pus, instead of becoming encysted and harmless, burrows in one or another direction until it perforates some adjacent organ—bowel, bladder, or vagina. An intermittent discharge of pus characterizes this stage, which, if long continued, results in death from exhaustion.

The *treatment* of the first stage of suppurative pelvic inflammation consists in rest in bed in the Fowler position, ice to the abdomen, hot vaginal douches, supporting food, and medicine. Early operation is rarely called for. Vaccine therapy may be helpful.

After the inflammatory reaction has subsided, operation is indicated—vaginal incision and drainage or the removal of pus-tubes by an abdominal operation.

GYNECOLOGIC TREATMENT

The non-surgical methods used in gynecology comprise—internal medication; the local application of drugs to the vulva, vagina, cervix, and endometrium; douches and sitz-baths; pessaries; the induction of hyperemia by the vacuum apparatus of Bier; electricity; pelvic massage, radium, and the *x*-ray.

Internal Medication.—The following drugs are used to arrest excessive bleeding from the uterus: ergot, hydrastis, stypticin, pituitrin.

Emmenagogues are drugs used to stimulate the menstrual flow; they include iron, manganese, apiol, and cantharides.

Drugs used to replace normal secretions which are deficient or absent—ovarian extract, corpus luteum extract, thyroid extract, mammary extract.

Drugs used for dysmenorrhea—viburnum prunifolium, phenacetin, diffusible stimulants.

Local Applications.—Inflammatory lesions of the vulva and vagina are treated with the various lotions, powders, and ointments used for similar conditions of the skin and mucous surfaces elsewhere.

Simple inflammatory lesions of the internal generative organs may be successfully treated by depleting tampons applied to the vaginal vault through a speculum.

Acute backward and downward displacements of the uterus can often be cured by medicated tampons combined with postural treatment. The tampons are applied in the knee-chest position, and the patient is taught to assume this position

several times a day for ten minutes at a time, and to sleep in the Sims position. The tampons remain in place one, two, or three days, depending upon the amount of discharge present; upon their removal, a cleansing vaginal douche is given. As a rule, a course of depleting douches is prescribed to alternate with the tampon treatments.

The *preparation for local treatment* is the same as the preparation for gynecologic examinations, which has already been described on page 24.

The drugs most frequently used are:

Tincture of iodin.

Argyrol in 25 per cent. and saturated solutions.

Skene's solution (iodin and carbolic acid).

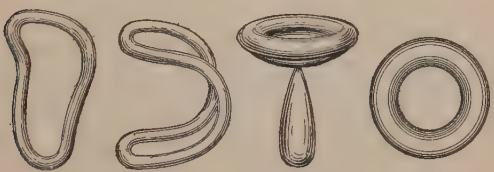

Fig. 31.—Pessaries: *a* Smith-Hodge; *b*, Gehrung; *c*, Menge's bar; *d*, ring.

Silver nitrate solution, 10, 30, 60 grains to the ounce.

Glycerite of ichthyol.

Glycerite of iodin.

Glycerite of hydrastis.

Boroglycerin.

Keep the glycerites in ointment jars and provide glass rods for spreading them upon the tampons. Provide blue poison bottles for the solutions.

Pessaries.—Pessaries (Fig. 31) are used to support the uterus and vagina. They are made of hard or soft rubber or of soft rubber inclosing a spiral spring.

After the correction of a movable retroversion a Hodge or Smith-Hodge pessary is inserted to maintain the uterus in the corrected position.

The Gehrung pessary is used for cystocele. Ring pessaries are used for prolapse of the vagina, and the Menge bar pessary, with or without a handle, for procidentia.

Pessaries are inserted by the physician; while they are being worn, a cleansing vaginal douche must be taken every night. The patient should visit the physician once a month, preferably after the menstrual period, for removal and replacement of the pessary.

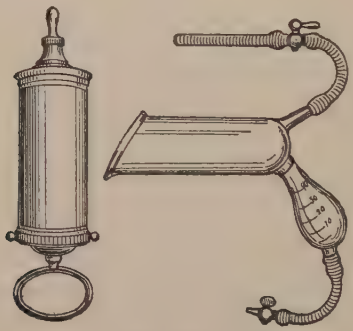

Fig. 32.—Hyperemia apparatus.

Hyperemia.—The vacuum apparatus of Bier consists of a cylindric glass tube, one end of which is open and fits over the cervix uteri; the opposite end is connected by rubber tubing with a suction pump (Fig. 32).

By means of the suction pump the air in the glass tube is exhausted and a vacuum created which produces hyperemia of the cervix, and, at the same time, thoroughly evacuates the secretions of the cervical canal by suction.

This form of treatment has proved particularly

useful in chronic endocervicitis, gonorrheal or otherwise.

Electricity.—Different applications of galvanic electricity are used to arrest excessive flow from the uterus and to stimulate undeveloped pelvic organs.

Radiotherapy.—The *x*-ray and radium are valuable in the treatment of skin disease of the vulva, malignant disease of the pelvic organs, and in certain cases of fibroid tumor.

MINOR GYNECOLOGIC OPERATIONS

Preparation of the Patient for Minor Gynecologic Operations.—Give a mild laxative, a lapactic pill, or a teaspoonful of cascara mixture at eight o'clock of the night preceding the operation.

Give a cup of black coffee eight hours before the time set for operation, provided this hour does not come during the night.

Send a specimen of the urine to the laboratory on the morning of the operation, and give a high soap-suds enema (see p 141) six hours before the operation. If the bowels move more than twice after this, give a second enema of salt solution.

After the bowels are emptied, give a sponge-bath and an alcohol rub. Wash the lower abdomen, inner surface of the thighs, vulva, and perineal region as far back as the coccyx with soap and water and absorbent cotton. Wash from above downward, separate the labia carefully, and throw away the cotton after it has touched the anus. Shave the labia, rinse the parts with hot sterile water, and give a vaginal douche of bichlorid solution 1 : 8000. Wash the lower abdomen, inner surface of thighs, vulva, and perineum with the *bichlorid solution*, dry with a sterile towel, and apply a sterile vulvar pad fastened to a T-bandage.

Dress the patient in an undervest, drawers, stockings, and short night-gown. Braid her hair in two braids.

Shortly before the time set for the operation wheel a stretcher to the bedside and help the

Minor operating-room.

patient upon it. Wrap her in a sheet and cover snugly with blankets; wheel the stretcher to the operating-room or etherizing-room, as the surgeon prefers.

The Minor Operating Suite.—The minor operating suite consists of a dressing-room, scrubbing-up room, and operating-room. These rooms are in charge of a supervising nurse and an operating-room nurse.

The Scrubbing-up Room.—This room contains an instrument sterilizer, a hot-water sterilizer, a washstand, and a long shelf for the solution basins. A basin of bichlorid solution holding a dipper and thermometer for mixing purposes is kept by the hot-water sterilizer. Two large enameled pails of cold sterile water and one pail of bichlorid solution 1 : 500 stand on the floor under the solution shelf.

The *minor operating-room* (Plate I) is a small room, well lighted by a large window at one end. The floor is cemented; the walls are painted with white enamel.

The furniture of the room consists of a glass operating table provided with detachable stirrup rods and an adjustable tray which receives all irrigating fluids and carries them into a waste-pan; a three-shelf glass instrument table; a glass instrument cabinet, three small enameled iron tables—one for the hypodermic outfit, one for dressings, and a third for the sterilizing and catheterizing outfit; a chair for the operator; a stool for the etherizer; a bench for solution pails; a stool for the operator's hand-basin; a stool for a basin of bichlorid solution; an enameled ware douche reservoir which hangs on the wall to the left of the operator; and an oxygen tank

Care of the Rooms.—The rooms are swept and dusted daily; the furniture of the operating-room is wiped off with carbolic solution once a day, and

the room is disinfected with formaldehyd gas after every infected case.

Preparation of the Rooms for Operation.—*Scrubbing-up Room.*—Start the hot water sterilizer in good time. Lay out four sterile gowns, caps, and masks in packages. Fill four hand-basins with hot water, and provide the same number of hand-brushes, nail-files, and jars of green-soap paste.

Place three oval solution basins on the shelf, fill one with 70 per cent. alcohol; the second with a hot solution of bichlorid, 1 : 2000; the third with hot sterile water. Provide a package of sterile towels for drying the hands and a basin containing four pairs of sterile gloves and glove powder.

Operating-room.—The operating-table stands opposite the window and about four feet from it, with the stirrup end directed toward the window. Pad the table with a folded blanket and sheet, place a low pillow at the head end and a white enameled pail on the floor at the foot of the table. The stirrups are to be slipped in place after the patient is on the table.

Place the etherizer's stool at the head of the table, and the operator's chair between the table and the window.

Cover the various tables, benches, stools, and top of the instrument cabinet with clean towels.

On the low bench place three covered buckets, two of cold sterile water and one of hot sterile water, and a basin of bichlorid solution 1 : 2000, containing a dipper and thermometer for mixing purposes.

Place three glass jars containing iodoform gauze packing—narrow, medium, and wide—on a shelf over the instrument table.

The small table for the catheterizing and disinfecting outfit stands immediately under the enameled douche reservoir; the end of the rubber tubing from the reservoir lies coiled up in a basin of bichlorid solution upon this table. In addition,

place upon this table a basin of bichlorid solution and one of sterile water; two pus pans—one for urine and one for uterine scrapings; a package of square gauze; a small tray holding a boiled glass catheter and vaginal nozzle; a bottle of green-soap mixture.

Next to this table place a wooden stool holding a basin of bichlorid solution for the hands.

The hypodermic table holds a box of hypodermic tablets, two sterile medicine glasses, two sterile hypodermic syringes, a bottle of alcohol, one of distilled water, one of camphor, one of whisky,

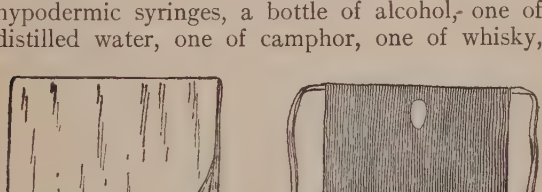

Fig. 33.—1, Leglettes; 2, perineal curtain.

one of adrenalin solution, 1 : 1000, vials of aseptic ergot, and a package of sterile square gauze. On this table is placed the etherizing outfit: cone, tongue forceps, gag, and ether in small cans.

On the table for dressings place a package of sterile leglettes (Fig. 33, 1), a perineal curtain (Fig. 33, 2), a T-bandage, safety-pins, and a sterile vulvar pad.

Spread a small sterile sheet over the top of the instrument table; lay out on the middle shelf three packages of sterile square gauze and a package of sterile towels; on the lowest shelf, a sterile basin for changing with the operator's hand-basin.

Place a basin of sterile water on a stool to the right of the operator.

Duties of Nurses at Operation.—When the anesthetist gives the signal, slip the stirrup rods

into their sockets and arrange the patient in the lithotomy position, with her hips drawn well over the edge of the table, thighs flexed upon the abdomen, legs upon the thighs, and feet in the stirrups. Arrange her arms across her chest or above her head and fasten in place by pinning the sleeves of her gown together or to the sheet covering the operating table, lay a folded blanket across her chest and abdomen. Push the patient's clothing well above her hips in the back and remove the vulvar pad.

The *operating-room nurse*, with sterile hands, washes the mons veneris, inner surfaces of the thighs, vulva, and perineum with green-soap mixture and sterile water. This done, she takes a pledget of cotton wet with green-soap mixture in one hand and in the other an irrigating nozzle connected with the douche-can filled with hot sterile water. She holds the ball of cotton in the vagina and, under a constant stream of water, smoothes out all the folds of the vagina and scrubs it thoroughly from the cervix to the vulvar orifice, removing all discharges and débris. When the hymen is intact, this procedure must be carried out with the utmost gentleness; in order to avoid tearing the delicate membrane, small pledgets of cotton must be used, held in the grasp of sponge-forceps. After the soap-and-water cleansing the vulva and vagina are irrigated with bichlorid solution 1 : 8000, followed by sterile water.

After the final sterilization the operating-room nurse catheterizes the patient, slips a sterile towel under her buttocks, and fastens the perineal curtain in place, tying it around the patient's legs on each side. The package of sterile leglettes is opened and handed to the assistant, who slips them over the patient's legs and stirrup rods and spreads a sterile towel over the lower abdomen.

The operating-room nurse watches the operator's hand-basin and removes it if the water becomes bloody, immediately replacing it by a basin of fresh sterile water.

When irrigation is called for, she lifts the coil of rubber tubing out of the bichlorid basin and hands it, without touching it near the free end, to the instrument passer, who slips the vaginal nozzle or irrigating curet into the tubing and hands it to the operator, resting the tubing upon the operator's right shoulder.

If it is desired to save specimens from curettage, this nurse holds the pus pan with its convex curve toward the table, a few inches below the weight speculum. These specimens, properly labeled, must be sent to the laboratory immediately after the operation.

The *supervising nurse* selects and sterilizes the instruments and suture material for each operation. The instruments are lifted from the sterilizer into sterile instrument trays, which are placed on the top shelf of the instrument table. After the operation she washes the instruments, sterilizes them, and puts them away in the instrument cabinet.

During the operation she administers hypodermics, if required; waits upon the etherizer, and directs the duties of the operating-room nurse.

When the operation is finished, one nurse lifts the patient's hips; the other removes the soiled towels and wipes the buttocks clean and dry. The vulvar pad is applied and pinned to a T-bandage fastened around the patient's waist. The stirrup rods are removed, the stretcher is rolled in, and the patient is lifted upon it, wrapped snugly in blankets, and returned to her bed.

The operating-room nurse proceeds to put the room in order.

DESCRIPTION OF MINOR GYNECOLOGIC OPERATIONS

Removal of a Urethral Caruncle.—This slight operation may be performed under general anesthesia or under local anesthesia with cocain; if the latter, no preliminary preparation is required aside from cleansing and disinfection of the vulva.

The *preparation on the table* is the same as for

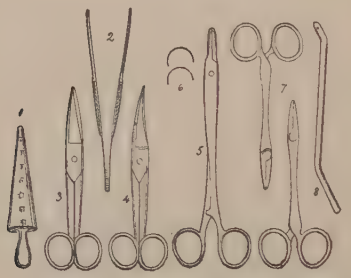

Fig. 34.—Instruments for excision of a urethral caruncle: 1, Urethral dilator; 2, anatomic forceps; 3, straight scissors; 4, curved scissors; 5, needle-holder; 6, needles; 7, hemostats; 8, catheter.

the minor operations, except that it is not necessary to disinfect the vagina. The caruncle must be touched very gently, because it is exquisitely sensitive.

If cocain anesthesia is to be used, the nurse injects a 10 per cent. solution of the drug into the urethra by means of an eye-dropper, and places a cotton ball saturated in the same solution against the caruncle. This anesthesia is complete in three minutes and lasts about ten minutes.

Steps in the Operation.—The urethral orifice is dilated, the caruncle drawn down, and sutures passed under it; it is excised and the sutures tied.

Instruments (Fig. 34):
Urethral dilator.
Anatomic forceps.
Needle-holder.
Fine needles, short and full curved.
One pair sharp-pointed scissors, straight.
One pair sharp-pointed scissors, curved.
Six hemostats.
Catheter.

Supplies.—Square gauze, fine silk, chromicized catgut No. 1.

Dressings.—After the operation a thick compress of square gauze is pressed against the urethral orifice and held in place by a sterile pad and T-bandages.

After-care.—Catheterize every eight hours if required. Irrigate with bichlorid solution 1:10,000, after urination and defecation. Keep the patient in bed five days.

Evacuation of a Vulvovaginal Abscess.—This operation is usually performed under local anesthesia by freezing with ethyl chlorid.

The *preparation on the table* is the same as for other minor operations.

Steps in the Operation.—The skin overlying the abscess is frozen, and the wall of the abscess is freely incised. The cavity may be irrigated with sterile salt solution or swabbed with carbolic acid; it is always packed.

Instruments:
Knife.
Scissors.
Probe.
Tissue forceps.
Six hemostats. One spoon curet.

Supplies.—Square gauze and narrow folded iodoform gauze packing.

The *dressings* and *after-care* are the same as for the preceding operation. The abscess cavity is repacked daily until healed.

Excision of a Vulvovaginal Cyst.—The *routine preparation* is followed.

Steps in the Operation.—An incision is made over the cyst, which is dissected out from its connective-tissue bed; bleeding arteries are tied and the space closed by buried and superficial sutures of catgut.

Instruments (Fig. 35):

Knife.
Blunt dissector.
Twelve hemostats.
Scissors, curved and straight.
Fine, full-curved needles.
Needle-holder.

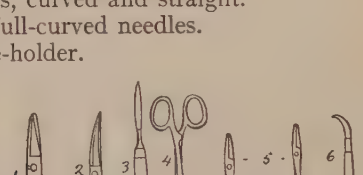

Fig. 35.—Instruments for excision of a vulvovaginal cyst: 1, Straight scissors; 2, curved scissors; 3, knife; 4, needle-holder; 5, hemostats; 6, blunt dissector.

Supplies.—Square gauze. No. 1 catgut, plain and chromicized.

The *dressings* and *after-care* are as above described.

Dilatation and Curettage.—This operation consists of two parts: first, stretching the cervix and orifices of the uterus; second, scraping away, by means of a curet, the lining mucous membrane, together with any débris or products of conception that may be contained in the cavity.

The *routine preparation* is followed, except that the labia are not shaved.

Steps in the Operation.—The cervix is exposed and seized with a tenaculum forceps, the orifices

and cervical canal are dilated, the mucous membrane and débris are scraped away, and the cavity is irrigated; in some cases it may be wiped dry and packed or drained with folded gauze.

Instruments (Fig. 36):
Weight speculum.
Vaginal retractor.
Tenaculum forceps.
Uterine sound.
Small and large Goodell dilators.
Curets—dull, sharp, triangular, fundus.
Packing forceps.
Scissors.
Sponge-forceps.
Glassware:
Catheter.
Vaginal nozzle.
Intra-uterine nozzle.

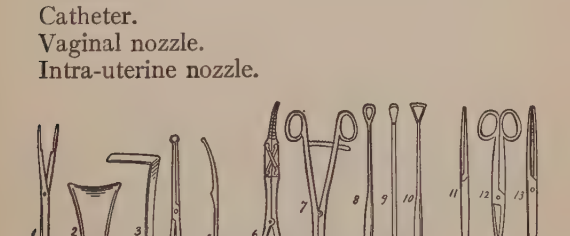

Fig. 36.—Instruments for dilatation and curettage: 1, Fundus forceps; 2, weight speculum; 3, vaginal retractor; 4, tenaculum forceps; 5, uterine sound; 6, 7, large and small Goodell dilator; 8, dull curet; 9, sharp curet; 10, triangular curet; 11, packing forceps; 12, scissors; 13, sponge-forceps.

Dressings.—T-bandage and sterile vulvar pad.

After-care.—If packing has been used, it will be removed by the physician twenty-four hours after operation. Prepare for the physician a nail-brush and soap, hot water, and bichlorid solution. Disinfect the vulva, arrange the patient in the dorsal

position lengthwise of the bed. Provide a pair of sterile dressing forceps and a pus pan.

After removal of the packing, give a vaginal douche of bichlorid solution, and daily thereafter a boric-acid douche.

The bowels are moved after one to three days, and the patient remains in bed one week or longer.

Diet.—Commence liquid diet after the stomach is settled, and continue it for twenty-four hours. Give semiliquid diet on the second day and solid food on the third.

Give water freely throughout the convalescence.

Trachelorrhaphy.—Trachelorrhaphy is the repair of a lacerated cervix.

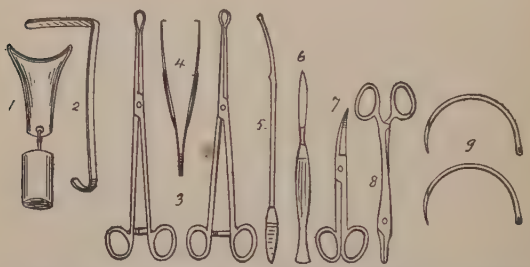

Fig. 37.—Instruments for trachelorrhaphy: 1, Weight speculum; 2, vaginal retractor; 3, tenaculum forceps; 4, tissue forceps; 5, uterine sound; 6, knife; 7, curved scissors; 8, needle-holder; 9, needles.

The *routine preparation* is followed.

Steps in the Operation.—The cervix is exposed, the area to be denuded is outlined, the scar tissue is excised, and the denuded surfaces are approximated by sutures.

Instruments (Fig. 37):

Weight speculum.

Vaginal retractor.

Two tenaculum forceps.

Uterine sound.
Knife.
Tissue forceps with teeth.
Curved sharp-pointed scissors.
Needle-holder.
Cervical needles—short, full-curved, cutting edge.

Suture Materials.—Plain catgut No. I., chromicized catgut No. II., and silkworm-gut.

The *after-care* is the same as for dilatation and curettage, with the exception of douches, which are not given unless especially ordered.

When silkworm-gut sutures are used, they are removed on the fourteenth day.

For their removal place the patient in the dorsal position cross-bed, or preferably upon an examining table in a good light. Provide an electric drop light when possible.

The physician sits on a stool in front of the patient and requires the following instruments:

Weight or Sims speculum.
Vaginal retractor.
Single tenaculum.
Long, sharp-pointed scissors.
Long anatomic forceps.

Give a bichlorid douche after the stitches are removed.

Amputation of the Cervix.—This operation consists in the removal of the hypertrophied or badly lacerated cervix.

Steps in the Operation.—The cervix is exposed, the hypertrophied areas are outlined and excised, the cut surfaces are approximated by sutures.

The *preparation*, *instruments*, *supplies*, and *after-care* are the same as for trachelorrhaphy.

Colporrhaphy.—Colporrhaphy is the repair of a tear of the vagina.

The *routine preparation* is followed.

Steps in the Operation.—The area to be denuded

is outlined, the mucous membrane is cut away, and the sutures are introduced and tied.

Instruments (Fig. 38):
Weight speculum.
Two tenaculum forceps.
Knife.
Twelve hemostats.
One pair straight scissors.
One pair curved, sharp-pointed scissors.
Anatomic forceps.
Needle-holder.
Martin needles No. 3.
Suture material:
Plain catgut No. 1.
Chromicized catgut No. 1. and 11.

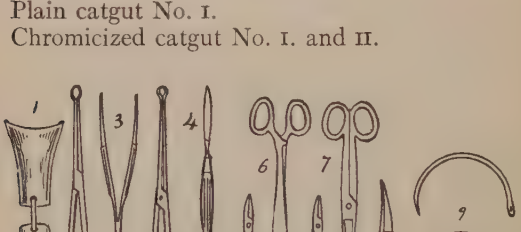

Fig. 38.—Instruments for colporrhaphy: 1, Weight speculum; 2, tenaculum forceps; 3, anatomic forceps; 4, knife; 5, hemostats; 6, needle-holder; 7, straight scissors; 8, curved scissors; 9, needles.

After-care.—Catheterize every four hours, otherwise follow the routine for trachelorrhaphy.

Cystocele Operation.—This operation is practically an anterior colporrhaphy with replacement of the prolapsed bladder.

The *routine preparation* is followed.

Steps in the Operation.—A straight incision is made in the median line of the anterior vaginal wall over the prominent cystocele, flaps are sepa-

rated on each side by blunt and sharp dissection, and the bladder is pushed up beyond the level of the internal os. The fascial planes of the anterior vaginal wall are approximated by buried sutures of catgut, after which the mucous membrane flaps are united by interrupted catgut sutures after suitable trimming off.

Instruments.—The same as for colporrhaphy, with the addition of a bladder sound. Suture material and after-care the same.

Perineorrhaphy is the repair of a torn perineum.

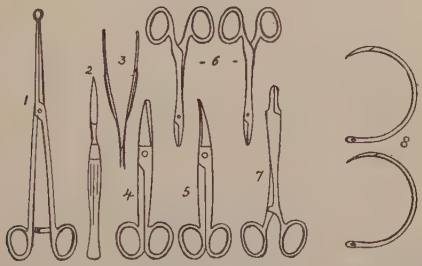

Fig. 39.—Instruments for perineorrhaphy: 1, Tenaculum forceps; 2, knife; 3, anatomic forceps; 4, straight scissors; 5, curved scissors; 6, hemostats; 7, needle-holder; 8, needles.

The *routine preparation* is followed.

Steps in the Operation.—The area to be denuded is outlined, denuded, and approximated by sutures.

Instruments (Fig. 39):

One large and two small tenaculum forceps.
Knife.
Anatomic forceps.
One pair straight scissors.
One pair curved, sharp-pointed scissors.
Twelve hemostats.
Needle-holder.
Martin's needles Nos. 2 and 4.

Suture material:

Plain catgut No. 1.

Chromicized catgut Nos. 1 and 2.

After-care.—Catheterize the patient every eight hours if she is unable to urinate.

The bowels are locked for forty-eight hours; during the first twenty-four hours liquid diet is given, during the second twenty-four hours soft diet. On the third day a capsule is given containing three grains of calomel and a half-grain of podophyllin; four hours later give a low soapsuds enema through a small, soft-rubber rectal tube.

After the bowels move give full tray and feedings at 10, 3 and 8 o'clock.

Care of the Stitches.—The success of a perineal operation depends largely upon the nurse who cares for the stitches; the secret of success lies in keeping them clean and dry without pulling upon them.

Direct the patient to keep her knees together as much as possible. She may be turned from side to side with assistance, the nurse lifting the buttocks while the patient holds her knees firmly together.

Dress the stitches after urination and defecation or three times a day, if the patient is being catheterized. First carefully scrub and disinfect your hands, then irrigate the stitches with a gentle stream of sterile water at 105° F., using a douche-bag and irrigating nozzle or an irrigating pitcher.

After irrigation, dry the stitches carefully with squares of sterile gauze, separating the patient's knees as little as possible. The dressing consists of several layers of square gauze laid against the perineum and held in place by a sterile pad fastened by a T-bandage.

Report daily the condition of perineal stitches, noting the character and amount of discharge,

the presence of blood, or cutting of the stitches.

Douches.—Vaginal douching plays no part in the routine after-care of perineorrhaphies, but occasionally some other minor operation is performed at the same time which necessitates a daily vaginal douche.

In giving this, great care must be exercised to avoid injury to the recently repaired perineum. The ordinary glass vaginal nozzle is entirely too large; instead of this, a slender glass catheter should be used. The nurse must have a good light, so that she can see exactly where the vaginal orifice is, and must bear in mind that, immediately after a perineorrhaphy, this orifice is very much narrowed and may be smaller than in the virgin. Remember that the orifice lies *above* all the stitches; insert the catheter carefully, and allow it to take whatever direction it will.

Perineorrhaphies have been ruined by using too large a nozzle or by pushing the nozzle between the stitches into the newly made perineum. If the patient complains of pain, or if any obstruction is encountered, it is proof that the catheter is being inserted in a wrong direction.

Silkworm-gut stitches on the perineal body are removed on the seventh day; those within the vagina, on the fourteenth day. For their removal, place the patient in the dorsal position across the bed or, preferably, on a table facing a good light.

Provide for the surgeon a brush, soap, and hot water, a basin of bichlorid solution, and a stool.

The following instruments may be required and should be in readiness:

Small Sims speculum.

Long and short sharp-pointed scissors.

Long and short anatomic forceps.

Single tenaculum.

The patient may get out of bed on the twelfth day and may leave the hospital after the fourteenth day, but should avoid all efforts at lifting or straining for a few weeks longer.

The marital relation may be resumed after six weeks.

Care After Operation for Complete Perineal Tear.—In these cases the bowels are locked for a week, the diet being restricted to beef-juice and albumin water.

On the eighth day calomel and podophyllin are given in capsule, followed after four hours by a wineglassful of Hunyadi water, to be repeated every two hours. An oil enema is given with the first dose of Hunyadi water and is retained. When the patient feels an inclination for a movement, a soap and water enema is given.

Vaginal Evacuation of a Pelvic Abscess.—The *routine preparation* is followed.

Steps in the Operation.—The vaginal vault is exposed and incised over the abscess; the abscess is opened, its cavity flushed and packed.

Instruments (Fig. 40):

Weight speculum.

Vaginal retractors.

Tenaculum forceps.

Knife.

Long scissors, straight and curved.

Two sizes of Goodell dilators for enlarging the opening.

Long, slender packing forceps, curved and straight.

Short, straight scissors.

Have ready for irrigation a douche-bag and

tubing, intra-uterine nozzle, two-way catheter, salt solution or boric-acid solution.

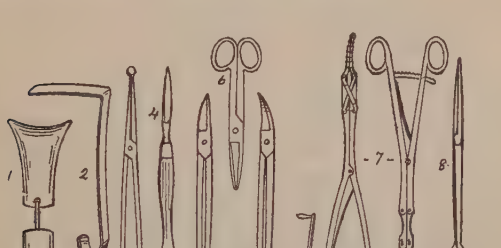

Fig. 40.—Instruments required for vaginal evacuation of a pelvic abscess: 1, Weight speculum; 2, vaginal retractor; 3, tenaculum forceps; 4, knife; 5, long scissors, straight and curved; 6, short straight scissors; 7, Goodell dilators; 8, long, slender packing forceps.

Provide rubber drainage-tubing, $\frac{1}{4}$ and $\frac{1}{2}$ inch wide, and folded iodoform gauze packing.

The *after-care* is the same as for dilatation and curettage. Douches may or may not be ordered; the patient stays in bed several weeks.

The abscess cavity is repacked, and possibly irrigated, every twenty-four to forty-eight hours, or at longer intervals until healed. For these dressings place the patient in the dorsal position across the bed, facing a good light, and with her hips on a Kelly pad.

Disinfect the vulva before the packing is removed; after it is removed give a bichlorid vaginal douche.

Instruments:

Weight speculum.
Vaginal retractors.
Two tenaculum forceps.
Two dressing forceps.
Small Goodell dilator.
Two-way catheter.

MINOR OPERATIONS IN PRIVATE HOUSES

The nurse should arrive at least one day preceding the operation. Select for the operation a well-lighted room—either the patient's bed-room or another room on the same floor.

Remove unnecessary furniture, heavy hangings, small pictures, and bric-a-brac. Fresh wash curtains may remain. Have the room thoroughly swept the day before operation, and the furniture wiped off with a damp chamois. Where the floor is covered with rugs which can be taken up easily, have this done; if not, protect the carpet with oil-cloth or thick layers of newspaper covered with a carbolized sheet.

The surgeon may send a portable operating-table to the house; otherwise a firm kitchen table is a good substitute. Let the table be scrubbed downstairs with hot water and soap, carried upstairs on the day of operation, and placed before the window.

Pad the table with a blanket and sheet, place a small pillow at the head end, the Kelly pad at the opposite end, a pail on the floor under the apron of the Kelly pad, a chair for the operator between the table and the window, and a small table to the right of this chair, for the operator's hand-basin of sterile water.

Use the top of the bureau for sterile supplies and for the scrubbing-up and catheterizing outfit.

Provide a table for the instrument passer; hang the patient's douche-bag on a stout nail or clothes-tree, about two feet above the level of the operating table.

Arrange one bed-room as a doctor's dressing-room. Provide hand-basins, brushes, and jars of soap paste for the operator and assistants; these may be arranged in the bath-room, in a bed-room, or in the operating-room.

Use the washstand in the operating-room for disinfecting solutions—one basin of bichlorid

solution and one of alcohol are sufficient. Place the basin of rubber gloves here also.

On the night before operation fill a clean wash-boiler with water, boil for one hour, and set aside to cool.

On the morning of operation sterilize the various basins, pitchers, and douche bag by boiling for twenty minutes in the wash-boiler. Eight basins will probably be required. Carbolize the Kelly pad in the bath-tub. When the time set for the operation approaches be sure that the wash-boiler filled with water is kept boiling on the range.

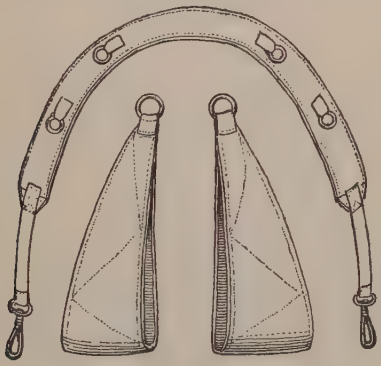

Fig. 41.—Leg-holder.

The preparation of the patient is the same as in the hospital. She is usually etherized on the table. The one nurse in attendance does not sterilize her hands; she arranges the patient in position and waits on the etherizer.

After the patient is under ether the nurse adjusts the stirrup-holder, or whatever form of leg-holder (Fig. 41) has been provided. If leg-holders are used, bear in mind that the body strap should pass *over* one shoulder and *under* the other.

Cleansing and disinfection of the patient on the table is carried out by one of the assistants.

Boil the instruments in an instrument boiler or clean fish-kettle. The same vessel serves as an instrument tray after pouring off the hot water and covering the instruments with cool sterile water.

Wrap the gloves in a towel and boil in a basin.

Obtain packages of sterile supplies—towels, gowns, gauze, leglettes, etc., from the hospital with which the surgeon is connected.

In *emergency operations in private houses*, much of this preparation must be dispensed with. The first thing to plan for is the supply of cold boiled water, and the first step in the preparation is to put a kettle of water on to boil for this purpose, or distilled water may be purchased from the drug store. As a rule, there is plenty of hot sterile water, but there may be great need of cold.

Disturb the room as little as possible, so as to avoid raising dust. Cover, with clean towels, the various pieces of furniture needed for the operation; provide two basins—one for scrubbing up, the other for bichlorid solution.

Boil the instruments in a fish-kettle or dish-pan which does duty as an instrument tray also.

Lift the patient out of bed upon a padded kitchen-table. A Kelly pad may be improvised by using a heavy bath-towel rolled lengthwise and curved to form the hollow of the Kelly pad; place over this a piece of oil-cloth pinned together in front to simulate the apron of the Kelly pad.

As a substitute for a leg-holder a sheet twisted into a rope may be used. Two people take hold of diagonal corners of the sheet and twist in opposite directions until a rope is formed. Place the center of the twisted sheet under the patient's neck; pass one end *under* one shoulder, the other end *over* the opposite shoulder. After the patient is etherized, flex the thighs on the abdomen and tie each end of the sheet around the corresponding thigh above the knee.

MAJOR GYNECOLOGIC OPERATIONS

Preparation of the Patient.—In emergency cases a thorough disinfection, on the table, of the skin of the abdomen may be the only preparation possible, but in all other cases a careful examination of the mouth, lungs, heart, blood-vessels, blood, and urine should precede operation. If the twenty-four-hour quantity of urine falls below 30 ounces, if granular casts are found, or glycosuria, if the hemoglobin percentage is below 50, the blood-pressure above 150, the chest full of râles, the mouth offensive from decayed teeth, etc., the patient is a poor surgical risk, and preparatory treatment extending over days or weeks may be required. If the nature of the surgical lesion renders such delay impossible, additional precautions must be taken to minimize the dangers of shock, hemorrhage, and anesthesia. After the patient has been passed upon favorably by the medical and laboratory examiners, and the date and hour for operation has been set, the immediate preparatory treatment for which the nurse is directly responsible can be begun. Its object is threefold: To secure a thorough emptying of the intestinal tract, to disinfect the skin in the region of the incision, and to stimulate the excretory function of the skin and kidneys.

The Day Before Operation.—The patient usually enters the hospital the day before operation; she should be advised to drink water freely and is given a light supper. After supper she is given a warm sponge or tub-bath and the abdomen is prepared. The nurse first scrubs her hands and

forearms for ten minutes with hot water and soap, and then immerses them for two minutes in alcohol or bichlorid solution (1 : 8000). The whole abdominal wall from the costal border to the symphysis and from flank to flank, the groins and upper part of the thighs, must be thoroughly scrubbed for ten minutes with sterile gauze, hot sterile water, and tincture of green soap, paying special attention to the umbilicus and pubic region. Shave the abdomen and mons veneris with a sterile razor, wash the surface with sterile water, followed by 70 per cent. alcohol, dry with sterile gauze, and apply a sterile gauze dressing and binder. At 9 P. M. give a half-ounce of castor oil; give nothing by mouth after midnight.

Day of Operation.—At 5 A. M. or later, depending upon the time set for operation, give a high soapsuds enema, followed by a douche of bichlorid solution, 1 : 8000. Send a specimen of urine to the laboratory. Two hours before operation remove the abdominal dressing and paint the skin of the abdomen from "costal border to symphysis and flank to flank" with tincture of iodin, 5 per cent. Apply a fresh dressing of sterile gauze and a sterile straight binder. As the time for operation approaches dress the patient in sterile clothes, wrap in a sterile sheet, lift her upon the stretcher, and wheel to the operating-room.

The Major Operating Suite.—The *major operating suite* comprises the following rooms: operating-room, anesthesia-room, sterilizing-room, supply-room, doctor's dressing-room, scrubbing-room, and bath-room. These rooms are situated on the top floor of the hospital, away from the noise and dust of the street.

The *major operating-room* is a large room, thirty feet long by twenty feet wide and twelve feet high. It is well lighted by two large windows facing the

Major operating-room.

north, and by a skylight. The floor is covered with white metile, the walls with white glazed tile to a height of four feet; the walls above this and the ceiling are painted with white enamel paint. A door at one end of the room opens into the hall; one at the opposite end opens into the scrubbing-room. (See Plate II.)

The room is heated by two steam radiators placed under the windows, and is lighted by electricity: a four-branched electrolier is suspended under the skylight, three feet above the operating table.

Two marble shelves are fastened to the wall at one end of the room.

Furniture of the operating-room:

1 Boldt operating table.
1 glass instrument case.
2 footstools for the surgeons.
1 revolving stool for the etherizer.
1 two-shelf instrument table.
5 small two-shelf tables: one for the dressing outfit, one for sponges, one for salt solution, one for the hypodermic outfit, and one for the hypodermoclysis outfit.
1 stool for the operator's hand-basin.
1 double basin rack.
3 benches.
1 enameled chair.
1 irrigating stand.
1 oxygen tank.

Care of the Operating-room.—The room is cleaned daily by the ward-maid; once in two weeks it is disinfected for twenty-four hours with formaldehyd gas; this is repeated after every septic operation. The windows are kept tightly closed, except while the room is being cleaned.

The *anesthesia-room* contains a stool for the anesthetist, a table for her outfit, a table for the

hypodermic outfit, a table for the catheterizing outfit, a tank of oxygen, and a nitrous oxid-oxygen apparatus.

The *sterilizing-room* contains a large table for the preparation of supplies, two high stools for the nurses, one filter, one hot and cold water sterilizer, one instrument boiler, one steam sterilizer, one dry sterilizer, and one utensil sterilizer.

The *scrubbing-room* contains a three-bowled stationary washstand provided with foot-taps, a shelf for the basins of disinfecting solutions, and a stand for the basin of sterile gloves.

The *doctor's dressing-room* contains a wardrobe for the surgeon's street clothes, a bureau in which the operating suits are kept, chairs, table, and a bed.

The *supply-room* contains closets with abundant shelf and drawer space for storing supplies, suture material, etc.

Circular muslin capes for visitors are kept in a closet in this room.

Staff of Nurses.—Four nurses are on duty in the major operating suite: the instrument nurse, the surgical supervisor, the operating-room nurse, and the sponge nurse. The two latter are pupil nurses; each serves for six weeks under the direction of the surgical supervisor, who is a graduate nurse holding a permanent position in charge of the major operating floor.

Duties of the Operating-room Nurse.—The operating-room nurse is responsible for the order and cleanliness of the entire operating suite. She daily tests the electric lights in each room, and keeps the rooms at a temperature of 75° to 80° F. Under the direction of the surgical supervisor she prepares and sterilizes all the salt solution used throughout the hospital, and all dressings and supplies used on the major operating floor. Supplies for the rest of the hospital are prepared on

the different floors, and are sent to the major operating floor for sterilization.

On operating days, she prepares the various rooms of the operating suite, lays out supplies, assists in the operating-room, and puts the rooms in order after the operations are over.

Duties of the Surgical Supervisor.—The surgical supervisor is responsible for the surgical cleanliness of the operating suite and for the technic of the nurses under her.

She superintends the operating-room nurse in the preparation of salt solution, supplies, and operating suite.

She selects and sterilizes the instruments, suture material, and gloves used at each operation; and, after operation, cleans the instruments and puts them away.

The Preparation of Salt Solution.—Sterile salt solution is used for flushing the abdominal cavity, for hypodermoclysis, and for intravenous injection. It is prepared and stored in glass Erlenmeyer flasks, each holding 1 or 2 quarts.

Before using, the flasks are washed with hot water, green-soap mixture, and ammonia, rinsed in sterile water, and soaked for two hours in a 1 : 1000 solution of bichlorid; they are then rinsed in sterile water and are ready to be filled.

A saturated solution of salt is prepared by adding six heaping tablespoonfuls of salt to a quart of water; this is boiled for an hour. To make physiologic salt solution three teaspoonfuls of the saturated solution are added to each quart of sterile water.

Bottling.—A sterile glass funnel is packed with sterile gauze and cotton. The salt solution is strained through this into sterile glass flasks. The top of each flask is cov-

ered with non-absorbent cotton and sterile gauze, which is tied securely around the neck of the bottle.

After being filled the flasks are boiled for two hours on two successive days in the saline boiler. This is a fish-kettle, 20 inches long and 8 inches deep; it holds three bottles.

Forty to fifty bottles of sterile salt solution are kept on hand; three bottles are heated for each major operation.

Preparation of Supplies.—*Sterile Clothes for Patient.*—The patient wears the following garments on the operating table: undervest, drawers, nightdress, stockings, abdominal dressing, straight binder, sterile sheet.

These articles are wrapped in one package and sterilized together.

Supplies needed for one major operation:

4 packages of towels, 6 in a package.
1 package of square gauze.
50 medium sponges.
25 small sponges.
1 laparotomy sheet.
10 strung sponges.
1 sterile sheet for the instrument table.
6 or 7 operating gowns.
1 package of caps, 7 in a package.
1 package of masks.
1 package of cotton balls.
1 package of cotton sticks.
Tubes of gauze packing, plain and iodoform.
1 abdominal dressing.
3 or 4 strips of adhesive plaster, 2 inches wide and 14 inches long. For Alexander operations 6 strips are required.

Square Gauze.—A layer of gauze 3 inches thick is cut into squares 4 by 4 inches. Each bundle of squares is wrapped separately.

Medium sponges measure 7 by 8 inches folded. To make a medium sponge, take a piece of gauze 18 inches square. Fold down one edge of the square (*a*) for about one inch, fold over edges *c* and *d* for about $5\frac{1}{2}$ inches (Fig. 42). Fold down edge *e* for about 4 inches. Fold the raw edges at *b* up toward *e* and slip them through the flap

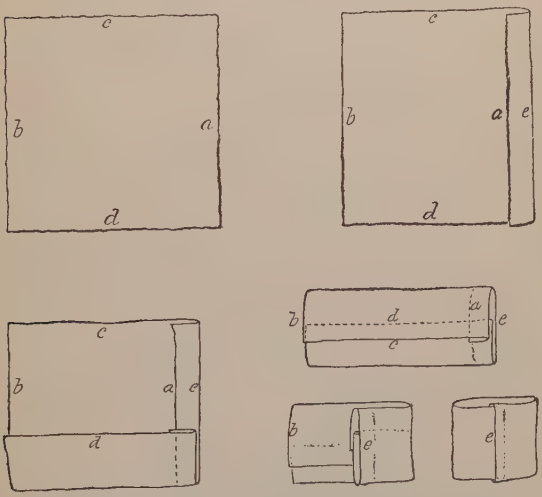

Fig. 42.—Method of folding a medium gauze sponge.

formed by *e*. The resulting folded sponge has no raw edges.

Small sponges measure 8 by 10 inches unfolded, 4 inches square folded. They are made like the above.

Large Strung Sponges (Fig. 43).—Fold a strip of yard-wide gauze in half lengthwise and cut off pieces 31 inches long. Turn down each end of the piece about $2\frac{1}{2}$ inches, and fold the piece in

half lengthwise. With a large needle and coarse cotton run together the ends and one long side of the sponge. Finish the sponge by running through one corner a thread of soft knitting cotton, about 14 inches long; knot the ends of the thread forming a loop.

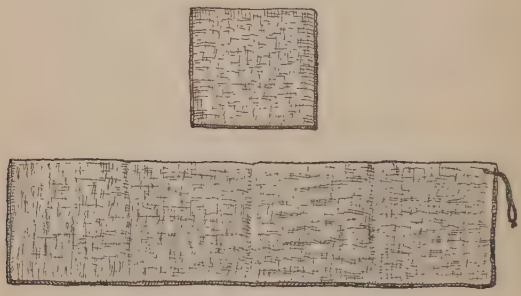

Fig. 43.—Medium sponge and large strung sponge.

Head Caps.—These are made of unbleached muslin after the pattern of a simple bathing cap.

Laparotomy Sheets.—These measure two by two and one-half yards. Three-quarters of a yard from the middle of the upper border of the sheet a square of material 7 by 7 inches is cut out and bound. With safety-pins four towels are pinned to the edges of this square, reducing it to a space 6 by 2 inches. An additional towel is pinned to the midline of the sheet above and below those surrounding the opening.

An *abdominal dressing* consists of one large sponge, two medium sponges, and one-third of a package of square gauze.

Sterilization of Supplies.—All the supplies are folded, wrapped securely in muslin, labeled,

and put in the steam sterilizer under fifteen pounds' pressure. They are sterilized three times, for two hours each time, and are dried by dry heat.

The green-soap paste used for scrubbing the hands is packed into glass jars within half an inch of the top and boiled for twenty minutes.

Sterilization of Utensils.—Sterilize in the utensil sterilizer for twenty minutes five oval basins, ten round basins (assorted sizes), three pitchers, four instrument trays, three buckets, and two specimen pans.

Preparation of Rooms on the Day of Operation.—The operating-room nurse has charge of this preparation.

Doctors' Dressing-room.—Lay out on the bed the proper number of operating suits.

Anesthesia-room.—Arrange the catheterizing outfit on a small table, the hypodermic outfit on another small table, and the anesthetist's outfit on the larger table. When the patient is anesthetized in the operating-room these preparations must be made there.

Test the oxygen tank, put fresh sterile water in the glass bottle connected with it, and boil the nose-piece before each operation; test the gas-oxygen apparatus and have extra tanks in readiness.

Bath-room.—The instrument passer and sponge nurse scrub up in this room. Prepare two stationary wash-bowls for them, supplying nail-files, brushes, and sterile green-soap paste.

Scrubbing-room.—Cover the window-sills with sterile towels; on one lay out a package of caps, a package of masks, the proper number of sterile gowns in packages, and rubber aprons, if required. On the other place one large oval basin containing sterile towels, and a second basin for the set of sterile gloves in their envelopes. Place with these a sterile powder shaker containing talcum powder sterilized twice in the autoclave.

On the washstand place three jars of green-soap paste, three nail-files, and a jar of bichlorid solution 1 : 8000, containing six hand-brushes which have been sterilized by boiling for twenty minutes.

Place three oval solution basins on the low shelf in this room. These basins are twenty inches long and six inches deep, so that the hands and forearms can be completely immersed in the solutions which they contain (Fig. 44). When the operator arrives on the floor, fill the first basin with 70 per cent. alcohol, the second with a

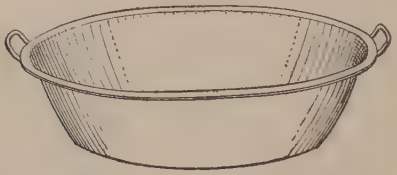

Fig. 44.—Oval solution basin.

hot solution of bichlorid 1 : 8000, the third with hot sterile water.

Operating-room.—Put on a pair of rubber-gloves and wipe off all the furniture of the operating-room with a 1 : 20 solution of carbolic acid. This done, remove the gloves and arrange the furniture.

Roll the operating-table under the electrolier, with its head end toward the window and about four feet away from it. Cover the table with a pad made of two blankets and a sheet folded to fit. On a shelf under the table place a pan to catch any overflow. Place the two footstools under the table and the etherizer's stool between the table and the window. Arrange the small tables as shown in the accompanying illustration (Plate II).

Now disinfect the hands and spread a small sterile sheet over the instrument table, and sterile towels over the small tables, benches, stools, and shelves.

Instrument Table.—On the upper shelf place two instrument pans; on the lower shelf, two trays for the specimens removed.

Dressing Table.—Place on this a bottle of alcohol and one of tincture of iodin, 5 per cent., a sterile covered dish into which the iodin is poured, a test-tube containing a small sterile sponge for applying the iodin, a package of sterile towels, a laparotomy sheet, an abdominal dressing, and adhesive plaster for the abdomen.

Sponge Table.—Place the sterile supplies on the lower shelf:

1 package of large gauze, 10 in a pack.

1 package of large, strung sponges, 10 in a pack.

4 packages of medium sponges, 25 in a pack.

5 packages of small sponges, 10 in a pack.

Place on the upper shelf:

1 basin for dry sponges.

1 basin for wet sponges.

6 to 8 sponge forceps.

Basin Rack.—Place on this the first assistant's hand-basin and a basin for large wet sponges.

Hypodermic Table.—Place on this a box containing hypodermic tablets in vials, a solution of adrenalin 1 : 1000, spirit of camphor, normal liquid digitalis, amyl nitrite perles, ergotol, and a solution of caffein citrate made according to the following formula:

℞. Caffein. citrat.....gr. x
Sod. salicyl.....gr. xvij
Aquæ dest.....f℥ij.

Four-ounce bottles containing 95 per cent.

alcohol, distilled water, aromatic spirit of ammonia, and whisky.

Three medicine glasses: one for sterile water, one for alcohol for disinfecting the barrel of the syringe, and one for camphor or whisky if required.

Two hypodermic syringes and needles.

One package of square gauze.

The oxygen tank stands beside this table.

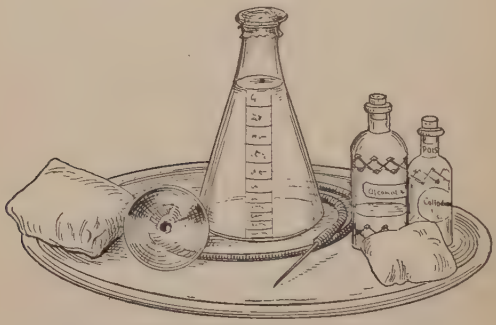

Fig. 45.—Tray with hypodermoclysis outfit.

Hypodermoclysis Table.—Place on this one bottle of hot salt solution, one of cold salt solution, and an empty graduated bottle for mixing.

Arrange in a sterile tray (Fig. 45) the sterile hypodermoclysis needle, rubber tubing, and glass funnel.

Place on this table also alcohol and square gauze for disinfecting the patient's skin, a package of sterile cotton sticks, one of cotton balls, and collodion for sealing the wound.

On the *high bench* place two sterile pitchers filled with hot sterile water, each covered with a sterile towel; one sterile basin containing bichlorid solution, a dipper, and a thermometer; two sterile basins—one is used for water for the surgeon's

hands and is placed on a small stool on the surgeon's left hand as soon as the operation commences; the other is used for changing with this.

Fig. 46.—Outfit for stimulating enema.

The supplies for the postoperative enema are placed on this bench—a one-quart glass graduate, a glass funnel, four feet of rubber tubing, a glass connector, and a soft-rubber catheter No. XII (Fig. 46). Boil these articles for three minutes before and after using, and keep in a sterile basin. One quart of hot water or salt solution is used for this enema, to which 1 ounce of whisky and 20 grains of ammonium carbonate may be added if stimulation is desired.

Place on the *low bench* three sterile buckets, one for carbolic acid solution, 1 : 20; one for bichlorid solution, 1 : 10,000; and the third for cold sterile water.

These buckets are taken from the utensil sterilizer with sterile hands and are placed upon the bench.

Cover the *radiators* with clean sheets pinned to fit. On one lay two blankets and a suit of clothes for the patient after operation.

Place a *pail* for soiled sponges at the foot of the operating table.

Preparation of Instruments, Needles, and Suture Material.—These are prepared by the surgical supervisor. She wraps the knife-blades in cotton, threads the needles through a gauze sponge, wraps them in a towel with the scissors, and boils for five minutes.

The other instruments are wrapped in a towel and boiled for twenty minutes in soda solution.

Silk and silkworm-gut are boiled alone in plain water for twenty minutes.

The glass tubes containing prepared catgut are boiled with the instruments for twenty minutes.

LIST OF INSTRUMENTS FOR ABDOMINAL OPERATIONS

6 bowel forceps.
2 scalpels.
2 pairs straight scissors.
2 pairs curved scissors, one long, one short.
1 pair peritoneal scissors.
1 short anatomic forceps.
1 long anatomic forceps.
4 rat-toothed forceps, two long, two short.
1 pair small retractors.
1 pair large retractors.
18 curved hemostats.
4 fine-pointed hemostats.
6 curved clamps.
2 straight clamps.
2 tenaculum forceps.
2 volsellum forceps.
6 sponge clamps.
1 bladder sound.
2 needle holders.
1 applicator.

1 short probe.
1 long probe.

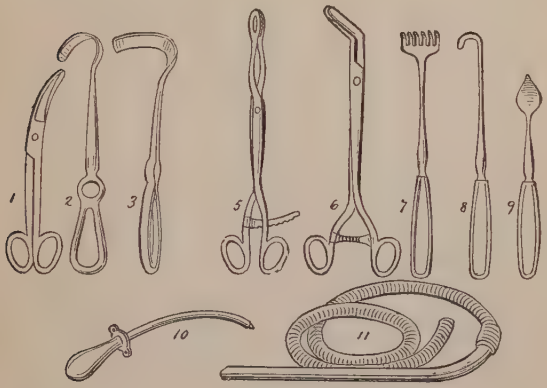

Fig. 47.—Instruments for abdominal operations: 1, Peritoneal scissors; 2, small retractor; 3, large retractor; 5, cyst forceps; 6, Sampson clamp; 7, toothed retractor; 8, blunt hook retractor; 9, spud; 10, small curved trocar; 11, large trocar and rubber tubing.

1 grooved director.
1 blunt dissector.

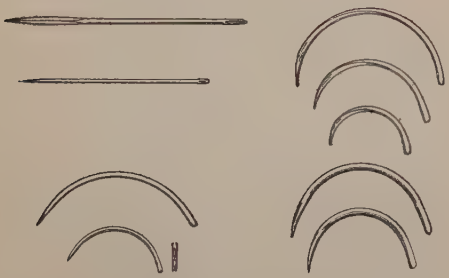

Fig. 48.—Needles for abdominal operations.

Small curved trocar.
Large trocar and rubber tubing.

Cyst forceps.
Spud.
2 toothed retractors for Alexander's operation (Fig. 47, 7).
2 blunt hook retractors for Alexander's operation.
2 Sampson clamps for panhysterectomy (Fig. 47, 6).
Needles: cutting edge, straight, and curved; round edge, curved, and subcuticular (Fig. 48).
For appendectomy add:
1 small retractor.
1 rubber-tipped appendix forceps.
1 crushing forceps.
1 tucker.
For gall-bladder operations add:
1 aspirating needle.
1 gall-bladder spoon.
1 gall-stone scoop.
1 gall-stone forceps.
2 gall-stone sounds.
1 cholecystectomy forceps.
2 intestinal clamps.
1 mushroom catheter drainage-tube.
2 cigarette drains.

LIST OF SUTURE MATERIAL FOR AN ABDOMINAL OPERATION

Plain catgut: No. 0, 2 tubes.
No. 1, 2 to 5 tubes.
No. II, 2 to 5 tubes.
Chromicized catgut: No. 0, 2 tubes.
No. 1, 5 tubes.
No. II, 2 to 5 tubes.
Linen thread: One glass spool of No. 0, 1, II, III, each spool containing $2\frac{1}{2}$ yards of silk.
Silkworm-gut: 12 strands.
The instruments and suture material are lifted

from the sterilizer by the towels in which they are wrapped; the knives, scissors, needles, linen, catgut, and silkworm-gut are placed in one tray; all the other instruments in another tray, and both trays are filled with cold sterile water. The instrument passer removes the towels and proceeds to arrange the instruments, thread needles, etc.

Preparation of Rubber Gloves.—The gloves are freely powdered on both surfaces with sterile talcum powder. The gauntlet of each glove is turned up one inch. They are arranged in crash envelopes (Fig. 49) with the name of the wearer plainly designated on each envelope. Five pairs of gloves constitute a set for every section case.

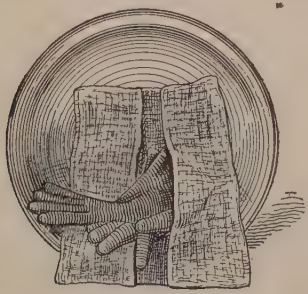

Fig. 49.—Gloves, glove envelop, and basin.

Sterilization.—Place envelopes containing one set of gloves in a towel, close package securely, put in autoclave and sterilize thirty minutes at fifteen to twenty pounds' pressure; resterilize for same time and same amount of pressure with dry heat, and the gloves are ready for use. If dry sterilization is not used, the gloves in their envelopes are boiled five minutes in sterile water and lifted into the glove pan, which is filled with sterile water.

Duties of the Operating-room Nurse During Operations.—While the surgeons are scrubbing, open a package of medium sponges and one of small sponges and drop them into a basin on the sponge table.

When the patient is wheeled into the operating-room, help lift her upon the table, pin her hands above her head, and arrange the blankets. Fold a single blanket in half lengthwise and lay it across the patient's chest, with the lower border reaching to the abdominal dressing; tuck the ends under the patient's back and arms. Fold another single blanket lengthwise and cover the lower limbs; let one edge reach the pubis and turn the other up under the patient's feet; wrap the blanket snugly around her feet and legs.

Remove the abdominal dressing and hand the two sterile towels which are used to cover the blankets. The skin of the abdominal wall from ribs to symphysis and flank to flank is now painted with tincture of iodin, 5 per cent., after which hand the laparotomy sheet.

Place a hand-basin on the stool beside the surgeon, fill it with hot sterile water, also the empty basin on the sponge table, and both basins in the basin rack. Watch these basins throughout the operation, and when the water in any one of them becomes bloody or cold, remove the basin and immediately replace it by another filled with fresh sterile water.

Prepare and give all hypodermics ordered during the operation, roll up the oxygen tank when required, receive the specimens upon specimen trays, and place these on the floor at one end of the room.

As the operation draws to a close collect the soiled sponges, arrange them in piles on a towel spread upon the floor, and count them, reporting the count to the sponge nurse and to the supervisor.

Receive all messages and report them to the supervisor, do not leave the room unless directed to do so by the supervisor.

At the end of the operation wheel in the stretcher; bring the warm clothes and hot blankets from the radiator, help to change the patient's clothes and to lift her upon the stretcher, accompany the patient to her room, and help lift her into bed.

Duties of the Sponge Nurse During Operations.—*Preparation for the Operation.*—Remove nurse's cap, cover the hair with a sterile cap, roll the sleeves up above the elbows; take a scrubbing-brush and scrub the hands, forearms, and elbows for ten minutes with hot water and green-soap paste. Pass the hands and arms through the disinfecting solutions, counting 120 while holding them in the bichlorid. Put on a sterile gown and a pair of rubber gloves. If the gloves are dry sterilized, the hands must be thoroughly dried on a sterile towel and freely powdered with sterile glove powder. Pick up each glove by the upturned gauntlet and draw on the hand carefully. When both gloves are on, adjust the fingers and turn the gauntlets down over the wrists. Do not touch the glove fingers with your ungloved hand. When the gloves are sterilized by boiling, put the left glove on first; pick the glove up full of sterile water, hold it in the right hand, and push the left hand down into it, displacing the water. After both gloves are on, squeeze the excess of water out from the finger-tips up.

Stand between the sponge table and the first assistant; you have charge of three basins: one for medium and small, dry sponges; one for wet sponges—medium, small, and mounted; and one for large and small strung sponges (wet).

Upon entering the operating-room the operating-room nurse drops a package of medium and one of small sponges into the first basin, and hands

an open package of strung sponges; from this package take three large strung sponges and drop them into the basin of sterile water on the basin rack.

Mount six sponge-forceps with small sponges neatly folded.

When the operator is ready to make the incision, lay a medium sponge on the sterile towel covering the patient's knees; as soon as this sponge is picked up, put a fresh one in its place; throughout the entire operation see to it that there is *always* one fresh medium sponge lying on the towel ready for use.

After the abdominal incision is made and the examination of the cavity completed, strung sponges will be called for. These are used to pack away the intestine and must be very hot. Lift a large strung sponge from the basin of hot water, squeeze it dry, and hand it to the assistant; a second and third may be called for. Keep count of the number of strung sponges in the abdominal cavity.

When a mounted sponge is called for, take one from the basin of sterile water, squeeze it dry, and hand to the assistant; immediately prepare another and have it ready to pass when the first is laid aside. Usually four or five mounted sponges are called for in rapid succession. As soon as one is laid aside remove it from the sterile towel; throw away the soiled sponge; remount with a fresh sponge, and place in the basin of sterile water.

The sponge nurse must know how many packages of small and medium sponges have been opened; this number, multiplied by twenty-five, or the number of sponges in each package, will give the total number of sponges which must be on hand at the end of the operation. As the operation draws to a close the soiled sponges are counted by the operating-room nurse; the number of unused sponges is given by the sponge nurse and, if this number corresponds with the total number used, the count is correct. If it does not correspond,

a careful search is made for the missing sponge upon the floor; several recounts are made, and the fact of a missing sponge is reported to the surgeon.

Duties of the Surgical Supervisor at Operations.—The surgical supervisor assists the surgeons in putting on their sterile gowns. She helps lift the patient upon the operating-table and elevates the table into the Trendelenburg position when required.

She administers hypodermoclysis when it is ordered; while the incision is being closed she gives the routine enema.

At the end of the operation she lowers the table from the Trendelenburg position, and after the abdominal incision has been closed, paints the suture line with tincture of iodin, 5 per cent., and finally hands the abdominal dressing and adhesive plaster. The adhesive plaster has previously been torn in appropriate strips and has been fastened on a towel. She assists in wiping the patient dry and in changing her clothing, and helps lift her upon the stretcher.

Throughout the operation she supervises and directs her assistant nurses; reports messages to the surgeon; verifies the sponge count; brings additional instruments and supplies, if required; and resterilizes any instruments that may have become soiled during the operation.

After Operation.—The surgical supervisor attends to the instruments and gloves.

The instruments are taken apart and washed in cold water, with gauze, until all blood is removed; they are then boiled ten to thirty minutes in soda solution; scrubbed with warm water and "bon ami" until bright; dried with gauze; polished with a chamois and powdered pumice, and returned to the dust-proof cabinet. After a knife has been used twice it is sent to the instrument shop to be sharpened.

The gloves are first washed in cold water to remove all blood-stains and organic matter before the gloves have become dry. They are then washed thoroughly inside and out in warm soap-suds containing a small amount of ammonia, rinsed in clear tepid water, and boiled in sterile water for three minutes, after which they are placed on a rack to dry with the gauntlet down. After drying on both sides they are mended, powdered, arranged in pairs according to size, each pair is wrapped separately in a gauze square and placed in its respective envelope.

The operating-room nurse collects the bloody clothing and towels in one package and the wet clothes in another package; both are sent to the laundry. She gathers up the sponges, puts them in a pail in the hopper, and lets cold water run over them until they are free from blood; this washed gauze is boiled, dried, and used for perineal dressings.

All the enameled ware utensils used in the operating-room are cleaned with green-soap mixture and Sapolio.

After pus cases the furniture is wiped off with carbolic acid solution and the room is fumigated for twenty-four hours. After clean cases the floor is mopped with soap and water and the entire operating suite is put in perfect order as speedily as possible.

Emergencies Which may Arise During Major Operations.—The chief emergencies which may arise during major operations are respiratory failure, hemorrhage, and shock.

The symptoms of *respiratory failure* are cyanosis, shallow respiration, and finally complete arrest of respiration. This condition is exceedingly grave, and the underlying cause must be discovered promptly and removed.

The immediate treatment consists in removal of

the anesthetic, swabbing out the throat to remove mucus, hypodermics of atropin and strychnin, and oxygen inhalations. The most severe forms require inversion of the patient and artificial respiration.

The symptoms of respiratory failure are apt to recur. The nurse must watch the patient closely after she has been put to bed, and must send for the physician promptly if cyanosis and shallow respirations persist. Oxygen inhalations must be continued until consciousness is regained.

Hemorrhage may be sudden, as from a severed artery or large vein, or may be gradual, as from the oozing of broken adhesions.

The symptoms are feeble, frequent pulse, shallow respirations, pallor and coldness of the skin, and pinched features.

The treatment of hemorrhage is both local and general. The surgeon seizes the cut vessel with a hemostat, or makes pressure upon it with the fingers or a sponge until a ligature can be thrown around it and tied.

Diffuse oozing may be arrested by pressure with hot sponges.

The general treatment of hemorrhage consists in the administration of salt solution by hypodermoclysis or intravenous injection and in the direct transfusion of blood.

Technic of Hypodermoclysis.—In women, salt solution is most readily injected into the fatty tissue under the mammary gland. The supervising surgical nurse uncovers one breast and disinfects the skin with alcohol. She is handed a basin which contains the hypodermoclysis outfit—hypodermoclysis needle, six feet of rubber tubing, and glass funnel. Salt solution is poured into the funnel until it runs out through the needle; the flow is then stopped by pinching the tubing. The nurse lifts the breast toward the sternum with one hand, while with the other she grasps the needle

and pushes it through the skin into the fatty tissue between the gland and the chest-wall. The needle must be inserted in an upward and forward direction, so that the point cannot enter the pleural cavity. As soon as the needle is in place the salt solution is allowed to flow; the funnel is held about two feet above the table, and is kept filled with salt solution. Each breast will hold about a quart. After removing the needle the opening is sealed with collodion and cotton.

Surgical shock is a condition of profound physical depression occurring during or after an operation.

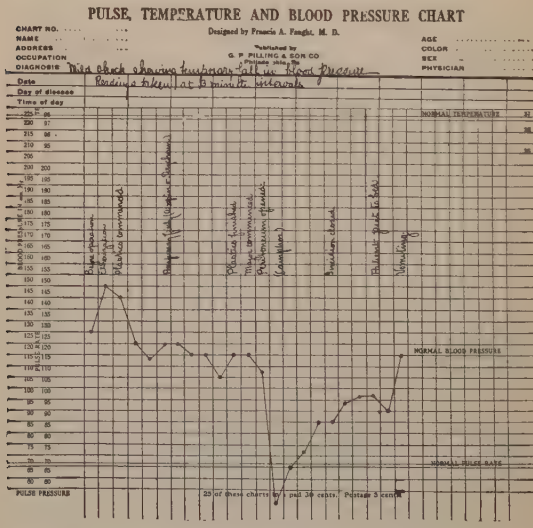

Fig. 50.—Temporary shock chart, showing fall in blood-pressure.

The symptoms are pallor of the skin, lividity of mucous membranes, feeble, frequent pulse, rapid and shallow respirations, low blood-pressure, cold perspiration, and subnormal temperature.

The symptoms of shock are caused by exhaustion of the vasomotor center. This leads to accumulation of blood in the abdominal viscera and a relative emptying of the blood-vessels of the rest of the body, especially of the brain.

The following factors predispose to surgical shock: prolonged operation, extensive manipulation or exposure of the intestines, hemorrhage, injury to the nerve-trunks, and enfeebled constitution.

The symptoms of shock may appear during an operation or at any time within the first twenty-four hours thereafter.

The treatment of shock requires energy and patience; it must be directed along the following lines:

1. The body heat must be maintained by hot applications, blankets, and hot-water bottles.

2. The empty blood-vessels must be filled with normal salt solution until the circulation is equalized. The salt solution may be administered by hypodermoclysis, intravenous injection, or by rectum. The Trendelenburg position, elevation of the foot of the bed, and bandaging the extremities with flannel bandages help to confine the patient's blood to the heart and brain.

3. Stimulation—camphor, atropin, strychnin, adrenalin—may be given hypodermically; oxygen by inhalation; black coffee or whisky and ammonium carbonate in salt solution by rectum.

DESCRIPTION OF MAJOR OPERATIONS

Ventrosuspension.—The operation of ventrosuspension consists in suturing the fundus of the uterus to the peritoneum of the anterior abdominal wall.

Steps in the Operation.—The abdomen is incised in the median line, adhesions are broken up, and the appendages examined.

The fundus is elevated to the incision and two silk sutures are passed through the peritoneum on one side of the wound and through the fundus of the uterus, then out through the peritoneum on the opposite side of the wound. These sutures are tied.

The pelvic cavity is wiped clean and the incision is closed.

After-care.—In order to avoid overdistention of the bladder and consequent traction on the suspension sutures the patient must be catheterized every six hours until able to void. Otherwise the usual routine is followed.

The Gilliam Operation.—The Gilliam operation is an intra-abdominal shortening of the round ligaments.

Steps in the Operation.—The abdomen is incised in the median line, adhesions are broken up, and the appendages examined.

A stout silk ligature is passed under each round ligament. The fascia, muscle, and peritoneum on one side of the incision are punctured by means of a sharp-pointed hemostat. The silk ligature under the corresponding round ligament is seized in the bite of this hemostat and is withdrawn, together with the round ligament, through the punctured opening until the doubled ligament emerges upon the surface of the fascia.

This is repeated on the opposite side; the round ligaments are stitched to the fascia and to each other, and the abdominal incision is closed.

The Alexander Operation.—The Alexander operation consists in shortening the round ligaments in the groins.

Steps in the Operation.—An incision is made in the groin down to the round ligament, which is then drawn forth from its sheath. This is repeated on the opposite side.

When the desired shortening is accomplished,

the round ligaments are stitched to the muscles and ligaments forming the inguinal canal; the excess of each ligament is cut off and the incision is closed.

The *after-care* is the same as for ventrosuspension.

Application of Adhesive Strips.—An additional piece of adhesive plaster is required on each side. This is applied first to the inner side of the thigh, is then carried upward and outward in the direction of the incision, to be fastened to the hip, beyond the gauze dressing.

Salpingo-oöphorectomy.— Salpingo-oöphorectomy is the removal of an ovary and tube.

Steps in the Operation.—The abdomen is incised in the median line, adhesions are broken up, and the appendages are examined.

The corresponding arteries are ligated, the appendages are cut away, the raw edges are sewn over, and the incision is closed.

After complete removal of both ovaries and tubes the menstrual periods cease; this phenomenon is called the artificial menopause.

Ovariotomy.—Ovariotomy is the removal of an ovarian cyst.

Steps in the Operation.—The abdomen is incised in the median line, adhesions are broken up, and the cyst is punctured by a large trocar. The walls of the cyst are seized with cyst forceps and drawn forth from the cavity to aid evacuation.

When the cyst is completely emptied, its pedicle is ligated and cut through; the collapsed cyst is removed, and the abdominal incision is closed.

Supravaginal Hysterectomy.—Supravaginal hysterectomy consists in amputation of the uterus on a level with the internal os.

Steps in the Operation.—The abdomen is incised in the median line, adhesions are broken up, and the blood-vessels ligated. The peritoneum of the anterior surface of the uterus is incised and

pushed down, the uterine arteries are ligated, and the uterus is amputated on a level with the internal os.

The uterine stump is sutured, the cut edges of the broad ligaments are united, and the abdominal wound is closed.

Panhysterectomy.—Panhysterectomy is the removal of the entire uterus, both body and cervix.

Steps in the Operation.—The preliminary steps of this operation are identical with those of an ordinary hysterectomy; it differs from the preceding operation in that the entire uterus is cut away, together with the upper portion of the vagina.

Before this can be done two right-angled clamps are set below the cervix, grasping the upper part of the vagina. The vaginal walls are cut across between the clamps, and the uterus and a cuff of vagina are removed. Before loosening the lower clamp the cut edges of the vagina are seared with the cautery. The clamp is now removed, the cut edges of the peritoneum are sutured, and the abdominal incision is closed.

Vaginal Hysterectomy.—Vaginal hysterectomy is complete removal of the uterus by the vaginal route.

Steps in the Operation.—The cervix is exposed by vaginal specula; it is seized by heavy forceps and drawn down toward the vulva; a circular incision is made around the cervix at the cervico-vaginal juncture, the peritoneum of Douglas' pouch is opened, two fingers are introduced, adhesions broken up, and the intestines packed away with gauze sponges; the peritoneum between the bladder and the uterus is opened, the uterine and ovarian arteries are ligated, the uterus and appendages are cut away, and the vagina is loosely packed with gauze.

Vaginofixation, or the Watkins-Wertheim Operation.—This operation is of great value in

the treatment of prolapsus uteri associated with extensive cystocele in women past the child-bearing period.

Steps in the Operation.—An incision is made over the cystocele and the bladder freed and pushed well above the level of the internal os. The dissection is carried further until the vesico-uterine fold of peritoneum is felt; this is opened and enlarged so that the fundus of the uterus can be delivered through it. Three or four catgut sutures are now placed, uniting the vaginal wall to the anterior surface of the uterus.

AFTER-CARE OF MAJOR GYNECOLOGIC OPERATIONS

During the week succeeding a major operation each patient occupies a separate room on the major operating floor. These rooms are furnished simply, without carpets, curtains, or ornaments; they must be well ventilated, without drafts. Each room is disinfected with formaldehyd and permanganate of potash for six to twelve hours after being vacated.

While the patient is in the operating-room the bed is prepared for her; the pillows are removed, the upper sheet, blankets, and spread are folded neatly at the foot of the bed, and hot-water bottles are laid upon the under sheet.

When the patient is brought from the operating-room the hot-water bottles are removed and the patient, wrapped in blankets, is lifted carefully into bed. The hot-water bottles are laid outside of the blankets, close to the patient, but not touching her—two at each side and one at her feet. The bed-clothes are drawn up, the room is darkened, and the patient is left in charge of her nurse, who takes and records the pulse and axillary temperature. The patient must not be left alone a moment until she fully regains consciousness.

The hot bottles and extra blankets form a veritable hot pack, which aids reaction; the patient may remain in this for several hours. As her face becomes flushed and her skin warm, the blankets and water bottles are gradually removed.

The patient may lie quietly, passing from ether narcosis into a natural sleep, or she may soon become restless and make efforts to push back the covers and throw out her arms. These movements must be controlled gently. As consciousness returns the patient's discomfort increases; she may vomit one or two mouthfuls of bile-stained fluid, and may complain of "feeling sick" or that her "stomach hurts" her, and may become quite restless. Her hands and face may be bathed in cool water, and her mouth may be wiped out with a bit of gauze dipped in ice-water.

Pain.—If the restlessness continues and the patient complains of pain, the surgeon usually orders a single hypodermic of morphin sulphate, $\frac{1}{6}$ grain, with atropin sulphate, $\frac{1}{150}$ grain, to be repeated once in the first twenty-four hours. Owing to its constipating effect morphin cannot be given to laparotomy patients after the first twenty-four hours. After this time considerable relief of pain may be effected by change of position.

"Gas pains" are relieved by turpentine stupes or light flaxseed poultices applied to the epigastrium, and by passing the rectal tube.

Vomiting.—Vomiting from the anesthetic usually ceases within twenty-four to forty-eight hours, but may last longer. Early vomiting may be relieved by inhalations of oxygen, aromatic ammonia, or vinegar. Later, counterirritation, as by a mustard paste, over the pit of the stomach, is helpful; the patient may be given a cupful of hot

water with a soda-mint tablet dissolved in it to wash out the stomach, or the stomach-pump may be used.

Position in Bed.—The patient is put to bed in the horizontal recumbent position, and it is desirable that she should remain in this position for the first few hours. As consciousness returns this becomes very irksome to the patient; she may be relieved by pillows under the head and back, by drawing up her knees and slipping a firm pillow under them; a second pillow

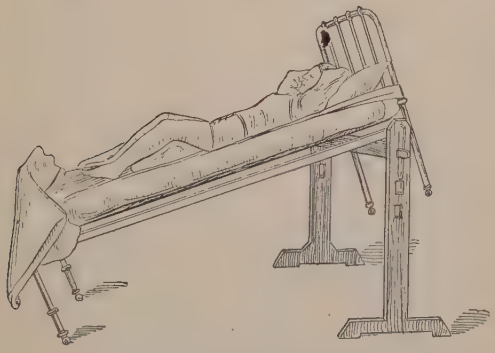

Fig. 51.—Fowler's position.

should be placed under the bed-clothes at the foot of the bed to support her feet.

After the patient is well out of ether she is rubbed off with alcohol, her clothing changed to a nightgown and undervest opening in front, and she is turned on her side; her knees are drawn up, and a small pillow is placed between them; her back is supported by pillows. After a few hours in this position the patient may be again turned upon her back or to the opposite side. The more comfortable a patient is, the better she will rest, and the less need there will be for sedative drugs.

Elevation of the Foot of the Bed.—After hemorrhage or in shock it is important to confine the blood to the brain centers as much as possible: for this purpose the foot of the bed is elevated 18 inches upon blocks or by means of a mechanical elevator. This position may be maintained for hours or days, and when the time comes to lower the bed to the horizontal, it must be done very gradually.

Fowler's Position.—In this position the head of the bed is elevated on blocks or by a bed elevator (Fig. 51), or the patient's head and shoulders are elevated about 12 inches upon pillows or an inclined plane. This is used for cases of septic peritonitis or pelvic abscess with vaginal drainage.

Pulse, Temperature, Respiration.—The pulse, temperature, and respiration are recorded every three hours for the first three days; afterward every six hours in a normal case. As a rule, there is a rise of temperature to 100° or 101° F. on the first or second day. This is termed the fever of reaction, and is probably due to the absorption of an aseptic ferment from the wound. In uncomplicated cases the temperature falls on the second or third day and remains near the normal line. If the wound or peritoneum has been infected, the temperature continues high and may be intermittent. A rise of temperature at the end of the first week usually signifies suppuration in the abdominal wound.

The pulse is quickened twenty or thirty beats for the first few days; it falls with the temperature if the case progresses smoothly. A rising pulse requires close watching.

The routine stimulation of the first week consists of strychnin sulphate, $\frac{1}{40}$ grain, every four hours; if the pulse is above 100, normal liquid digitalis, 3 minims, is given with the strychnin. All medication is given by hypodermic until the stomach is able to retain water.

Facial Expression.—This is an important aid in estimating the patient's condition. A bright, natural expression attends normal convalescence; a flushed, dusky hue or pinched and anxious features point to the presence of complications.

Use of Catheter.—After ventrosuspension, the Alexander operation, and the Gilliam operation the patient is catheterized every six hours for the first three days; later, every eight hours if unable to void.

After other abdominal operations the catheter is used once in eight hours.

A catheterized specimen of urine should be sent to the laboratory daily for the first three days after a major operation.

Diet.—Water, hot or cold, is given freely as soon as the patient is able to swallow. When the stomach is settled, feedings of hot tea or broth are commenced. Small quantities are given and increased gradually.

Liquid feedings, with the exception of milk, are given every two hours for the first three days; on the fourth day after operation semiliquid diet is given, with feedings at 10, 3, and 8 o'clock.

On the seventh day full diet is given, with feedings at 10, 3, and 8 o'clock.

Care of the Bowels.—On the third day after operation the bowels are moved by a soapsuds enema; this is repeated on the fourth day, and on the evening of the fourth day a laxative is given, for example, two lapactic pills; this is followed by 4 ounces of Hunyadi water or citrate of magnesia the next morning.

If there is no result from an enema, and the patient is uncomfortable, it may be repeated in six hours, or a more stimulating enema may be given as follows:

℞. Castor oil, } of each, ½ ounce;
Magnesium sulphate, }
Turpentine..... 2 drams;
Glycerin..... 4 ounces;
Hot water..... 1 pint.

A small rectal tube may be inserted for an hour several times a day if there is much flatulence.

Removing Stitches and Dressing the Wound.—If all goes well, the wound is not touched until the seventh to tenth day.

Preparation.—Have ready for the surgeon a basin of hot water, nail-brush, soap, bichlorid solution 1 : 8000, a small apron, and a pair of sterile gloves.

Have ready upon a tray bandage, scissors, a package of sterile towels, pus pan, an instrument tray containing sharp-pointed scissors, anatomic forceps, probe, a basin of bichlorid solution and one of sterile water, a package of sterile gauze, large folded gauze, adhesive plaster, narrow, folded iodoform packing, and tincture of iodin.

Arrange the patient in the horizontal position and expose the abdominal dressing. Cut the adhesive strips on one side close to the gauze; use bandage scissors, and loosen the adhesive by slipping one finger under it before cutting. Raise the upper layers of the abdominal dressing by means of the adhesive plaster, and turn the dressing back over the side of the bed.

Open a package of sterile towels and hand them to the surgeon, who arranges four towels to form a hollow square around the abdominal dressing. The surgeon lifts off the remaining layers of the dressing and drops them into the pus

pan. If the lowest layers are adherent, they are loosened by dropping sterile water over them.

The surgeon now takes scissors and forceps, cuts the stitch or stitches, and removes them. If primary union has occurred, tincture of iodin (5 per cent.) is painted along the line of incision, a few layers of sterile gauze are laid over the incision, and a fresh pad and adhesive strips are applied. The old dressing is removed by cutting through the plaster strips close to the skin; the part fastened to the skin may be left, and the new strips applied over them, or the old ones may be removed. When this dressing becomes soiled or uncomfortable, the nurse may replace it by a smaller one.

If the wound has broken down or a stitch abscess occurred, daily dressings may be required and gauze drainage.

Getting Out of Bed.—The time for this varies with the nature of the operation and the patient's general condition—from ten to fourteen days in bed is the average.

The Abdominal Bandage.—Patients with heavy or flabby abdominal walls should wear an elastic bandage for six months to a year after the operation. For patients of average development, a surgical corset is desirable. If septic infection of the wound occurs, with healing by granulation, separation of the scar and a more or less extensive ventral hernia will probably result in spite of bandaging.

Convalescence.—Convalescence after an abdominal operation is rapid or slow, depending upon the severity of the operation, the previous general health of the patient, and the occurrence of complications.

The average brain-worker may return to work within six to eight weeks after operation. Patients of the laboring class must wait two to four months, and must be directed to avoid lifting heavy buckets or tubs for some time longer.

Every patient should be under a physician's care for six months to a year after operation, so that any local or general sequelæ may be dealt with as they arise.

The period between leaving the hospital and returning to work or home duties is best devoted to a change of air and scene. A few weeks at the shore among healthy strangers soon dispels the habit of invalidism.

COMPLICATIONS WHICH MAY FOLLOW ABDOMINAL OPERATIONS

Secondary Hemorrhage.—This terrible and fortunately rare accident results from loosening of a ligature on some important vessel. It usually occurs in the first forty-eight hours after operation. The symptoms are a feeble, frequent pulse, gradually lost at the wrist, rapid sighing respiration, increasing pallor, cold clammy skin, great restlessness, air hunger, and abdominal pain. The treatment is immediate secondary operation, followed by intravenous transfusion, the application of external heat and appropriate stimulation.

Acute Gastric Dilatation.—This serious condition has been variously attributed to spasm of the pylorus, pressure upon the duodenum, reflex paralysis, etc. The symptoms are persistent, effortless vomiting of large quantities of olive-green or dark-brown fluid which does not become fecal; distention of the upper abdomen with no rigidity, little tenderness and considerable pain; normal or subnormal temperature, with rapid pulse, great thirst, and signs of collapse.

The treatment consists in emptying the stomach by means of the the stomach-tube and keeping it empty. The patient's hips are elevated so that the stomach and intestines shall gravitate toward the diaphragm and a tight binder is applied. Rectal feeding must be resorted to for several days.

Septic Peritonitis.—Septic peritonitis is an inflammation of the peritoneum resulting from infection by pyogenic organisms.

The infection may be introduced from without by means of infected instruments, dressings, suture material, or by the hands of the surgeons or nurses. It may be carried in from the patient's skin, if this has not been properly prepared; or the cause may be within the patient's abdomen, in the form of a collection of pus which, through some accident of operation, may rupture and infect the peritoneum.

The earliest symptoms are abdominal pain and tenderness on pressure; the abdomen soon becomes distended, and vomiting is persistent, the vomited matter consisting of a characteristic, greenish fluid.

The temperature rises rapidly, and remains near 103° or 104° F., or the temperature may become irregularly intermittent, high fever alternating with chills and drenching sweats. The pulse is rapid and wiry—140 to 160; the respirations are rapid and shallow. There are, at first, restlessness and persistent insomnia, followed by delirium and finally by stupor. The bowels and bladder are emptied involuntarily.

The prognosis is very grave.

In the treatment of septic peritonitis the patient is kept in Fowler's position; hot poultices and fomentations are applied for pain; and strychnin,

whisky, digitalis, caffein, and atropin are given hypodermically, as indicated. The most important part of the treatment of this grave complication consists in the administration of salt solution by bowel by the drop method.

Technic of Slow Enteroclysis.—The apparatus required consists of a soft-rubber rectal tube, connected by means of rubber tubing and glass connectors, with a receptacle for salt solution.

The reservoir must be elevated six inches above the level of the bed, and the fluid contained in it must be kept at 102° F. The rate of flow should be one quart the first hour and one pint an hour thereafter. The rapidity of the flow is regulated by raising or lowering the reservoir. If a feeling of tightness or distress is caused, the flow is too rapid. As a rule, the patient can take five pints without discomfort; after this it may be necessary to retard the flow or to stop it for a time.

Constant attention on the part of the nurse is essential.

Post-operative Intestinal Obstruction or Ileus.—A knuckle of bowel may slip through a hole in the omentum, or under a band of adhesions, and become strangulated; the bowel may adhere to a raw surface, forming a kink which prevents the passage of intestinal contents, or the bowels may become adherent among themselves about a septic focus.

The symptoms of intestinal obstruction are paroxysmal pain, obstinate constipation,—neither gas nor feces pass by rectum,—nausea, and vomiting.

"The contents of the stomach are first ejected, later bile, then dark fluid with fecal odor, and finally liquid feces" (Howard Kelly).

The abdomen becomes enormously distended

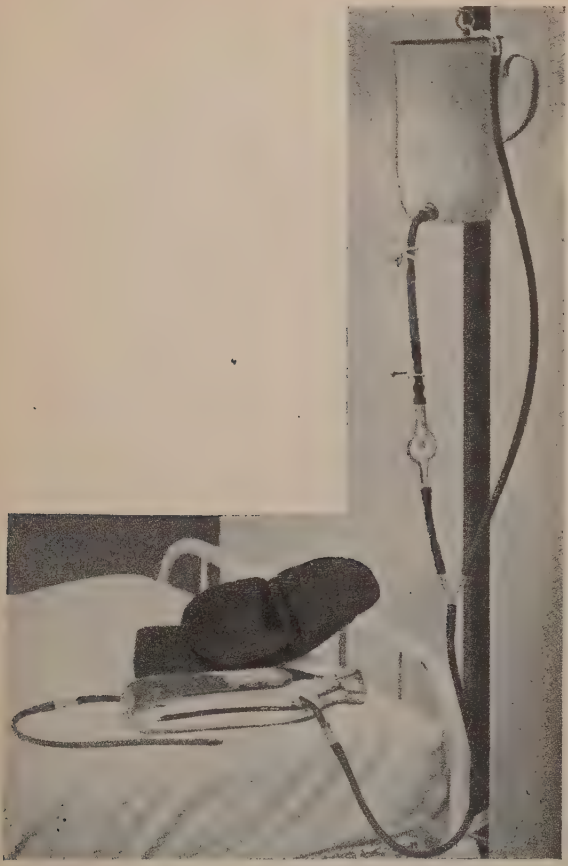

Fig. 52.—Apparatus for continuous proctoclysis (Murphy drip): This apparatus consists of an especially constructed glass nozzle through which the drops can be seen, a screw compressor above the glass nozzle for regulating the rapidity of the drops, a return-flow tube which is attached to the solution container by a glass U tube for the escape of gas from the bowels, a glass Y tube for attaching the solution tube and the return-flow tube, and a metal solution heater which rests upon the bed. A felt cover is provided for the heater when in use, but for the photograph it was removed to show how the tubing passes through the metal heater (Warnshuis).

and tender. The patient is rapidly exhausted, her eyes become sunken, her face pinched, and her expression anxious. The temperature remains at or about normal, but the *pulse is rapid;* this disproportion between pulse and temperature may be the first indication of trouble.

If the diagnosis is made early, secondary operation may save the patient's life. As a rule, by the time the diagnosis is established, the patient is so profoundly poisoned by absorption from the obstructed bowel that she dies in collapse with or without operation.

Femoral Phlebitis.—Inflammation of the femoral vein occurs in about 1 out of every 100 patients convalescing from laparotomies. This complication makes its appearance from two to three weeks after operation.

The symptoms are fever, rapid pulse, deep-seated pain along the inflamed vessel, and edema of the leg. The vein becomes swollen and hard, its walls are thickened, and its cavity is filled with blood-clot.

The danger of phlebitis lies in the possible detachment of a portion of blood-clot. This emigrating blood-clot is called an embolus; it is borne by the venous circulation to the heart and, if large, may lodge there, causing sudden death; or, if smaller, it may pass through the heart and cause death by blocking the pulmonary artery.

A patient with phlebitis must be kept in bed until the inflammation has entirely subsided. The limb is elevated, and ichthyol ointment is applied on lint along the course of the vein; a long narrow ice-bag is tied to the limb outside of the lint.

The nursing of a case of phlebitis is an extremely responsible task; the patient must be kept comfortable with as few changes of position as possible;

she must be assisted in moving, and under no circumstance should pressure be made over the inflamed vein.

Convalescence from phlebitis is tedious, usually extending over six to eight weeks. Some lameness of the extremity may persist.

Embolus.—An embolus is a fragment of blood-clot detached from an inflamed vein. The original clot is usually situated in the pelvic or femoral veins; a portion of it may be dislodged and carried to the heart and pulmonary artery.

If the embolus is small, it produces symptoms of precordial distress, pain, dyspnea, and rapid pulse; there may be fever following the attack, and more or less cardiac irregularity for a time.

If the embolus is large, the patient suddenly sits up in bed, cries out or gasps for breath, and falls over dead in a few seconds.

THE URINARY ORGANS OF WOMEN

The urinary organs consist of the kidneys, the ureters, the bladder, and the urethra.

The *kidneys* are paired organs, situated one on each side of the vertebral column, behind the

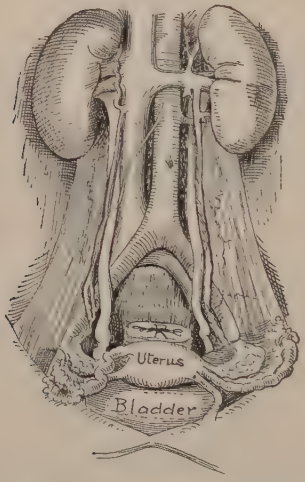

Fig. 53.—Kidneys, ureters, and bladder

peritoneum. The upper pole of the kidney is on a level with the twelfth dorsal vertebra; the lower pole, on a level with the third lumbar vertebra (Fig. 53).

Each kidney is about four inches long, two and one-half inches wide, one inch thick, and weighs four to five ounces.

The *ureters* are two membranous tubes which conduct the urine from the kidneys to the bladder. Each ureter commences within the kidney in a number of small pockets which unite to form a dilated sac called the pelvis (Fig. 54); from this the ureter proper descends to the bladder as a cylindric tube, about sixteen inches long, and about the diameter of a goose-quill.

The *bladder* is the reservoir for urine; it is a musculomembranous sac, situated between the

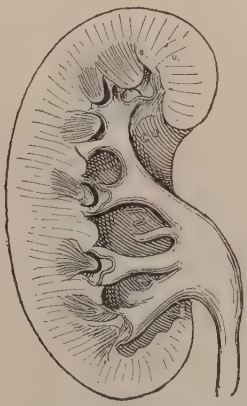

Fig. 54.—Section of kidney showing pelvis.

symphysis pubis and the uterus. When filled with urine, the bladder expands and assumes a rounded form; when empty, the organ collapses, the upper movable portion sinking down into the firmer lower portion like the layers of a collapsing cup. The moderately distended bladder holds about a pint.

The *urethra* is a musculomembranous tube, about one and one-half inches in length, extending from the neck of the bladder to the meatus urinarius. It is embedded in the connective tissue between

the vagina and the symphysis, and assumes a slightly curved direction around the symphysis.

The average diameter of the urethra is ¼ inch.

DISEASES OF THE URINARY ORGANS

Nephritis is an inflammation of the kidney substance.

Pyelitis is an inflammation of the pelvis of the kidney. This inflammation may be caused by a renal calculus or may result from some ascending or descending infection.

Ureteritis is an inflammation of the ureter.

Cystitis is an inflammation of the mucous membrane lining the bladder. The inflammation may be diffuse or circumscribed; the trigone, or that portion of the mucous membrane immediately surrounding the urethral and ureteral orifices, is most frequently affected.

The commonest cause of cystitis is infection during catheterization; this is, therefore, a disease for which the nurse is frequently responsible.

The symptoms of cystitis are pain in the bladder, vesical tenesmus, frequent and painful urination; the urine may be cloudy or bloody, or may be perfectly clear. Upon microscopic examination it is found to contain pus and bacteria.

Urethritis is an inflammation of the urethral mucous membrane; it is often of gonorrheal origin.

The symptoms are vesical tenesmus, with frequent and painful urination.

Calculi may form in the kidney substance, in the renal pelvis, in the ureter, or in the bladder. The symptoms produced vary with the location of the stone. Renal colic signifies the paroxysms of pain attending the passage of a stone through the ureter.

Tuberculosis of the urinary organs begins, as a rule, in the renal substance; in time the tubercles break down, the germs are carried through the pelvis and ureter to the bladder, causing in turn

tubercular pyelitis, ureteritis, and cystitis. This is called a descending infection.

Gonorrheal infection is the typical ascending infection. The urethra is involved first, then the bladder, and in rare cases the ureter and pelvis of the kidney.

THE TECHNIC OF CATHETERIZATION, BLADDER IRRIGATION, AND CYSTOSCOPIC EXAMINATIONS

Catheterization.—Catheterization is the evacuation of the contents of the bladder by means of a tube-like instrument—a catheter.

This little operation usually devolves upon the nurse, and, although seemingly of minor importance, must be carried out with a thoroughly aseptic

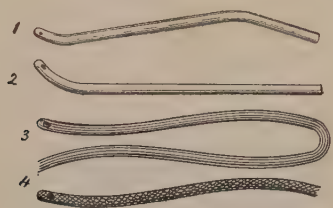

Fig. 55.—Catheters: 1, Glass; 2, silver; 3, soft rubber; 4, elastic.

technic. Numerous cases of infection of the bladder are traceable to faulty catheterization, and it should be a matter of pride and of conscience with every nurse to prevent the occurrence of such a case in her own practice.

Catheters (Fig. 55) are made of glass, silver, soft-rubber, and elastic fiber. All forms can be sterilized by boiling. The glass catheter is preferred because it is inexpensive, can be boiled repeatedly, and shows at once whether it is clean or not.

Technic.—Boil a glass catheter for five minutes in a shallow instrument tray. While it is boiling place a small table to the right of the patient's bed, near the foot. Arrange on this a small basin of sterile water, one of bichlorid solution 1 : 10,000, a jar of green-soap mixture, and a package of sterile gauze, opened. Place the tray containing the catheter on the table after boiling.

Arrange the patient in the dorsal position, draping a sheet over her to avoid exposure. Place a pus pan on the bed close to the perineum, and, if necessary, arrange a drop-light or firmly fixed candle in position to illuminate the vulva.

Scrub your hands for five minutes with hot water and soap, then hold them in bichlorid solution for two minutes. Standing on the right side of the bed, clean and disinfect the vulva with soap and water and bichlorid solution 1 : 10,000; use sterile gauze or cotton balls, and pay particular attention to the mechanical cleansing of the vestibule and urethral orifice; ten or twelve pieces of gauze or cotton should be used. This finished, dip your hands in bichlorid solution once more; pick up the catheter with the right hand, holding your thumb over the open end of the catheter; separate the labia with the thumb and forefinger of the left hand, and insert the catheter into the urethral orifice without touching any other part of the vulva (Fig. 56).

It will be noticed that the bladder end of the catheter is slightly curved, to correspond with the curved course of the urethra around the symphysis; for this reason the catheter must be introduced with the concavity of this curve upward; it will be found to follow, of itself, a slightly curving direction around the symphysis.

After the catheter has been inserted about two inches, remove your thumb from the open end and let the urine flow into the pus pan. As the flow diminishes make gentle pressure above the sym-

physis until the last few drops have been emptied. Reapply your thumb to the end of the catheter, to prevent dripping of urine; withdraw the instrument gently and return it to the instrument tray.

Beginners frequently make the mistake of inserting the catheter into the vagina instead of into the urethra. A thorough knowledge of the anatomy of the vulva will prevent this accident. If it should occur, the catheter must be reboiled before being inserted in the proper place. Never catheterize a patient unless the parts are fully exposed and under a good light.

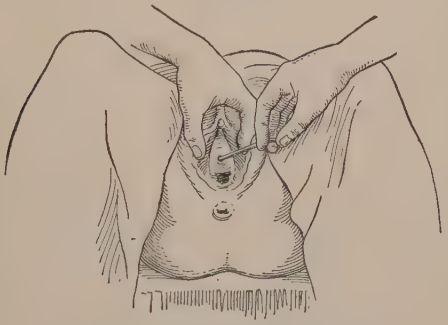

Fig. 56.—Catheterization of the bladder.

Washing Out the Bladder.—Vesical irrigation is the approved treatment for subacute or chronic diffuse cystitis. This procedure is usually carried out by the nurse, and the same precautions must be observed as in catheterizing. In fact, catheterization is the first step in giving a bladder-wash.

The *apparatus required* consists of a one-quart enameled ware pitcher, a glass catheter with six inches of thin rubber tubing attached, a glass funnel about three inches in diameter, to which are attached four feet of rubber tubing and a glass irrigating nozzle with a point sufficiently fine to fit into the rubber tubing on the catheter (Fig. 57).

Preparation.—Arrange on a small table the disinfecting outfit, as described under catheterization. Boil the above-mentioned apparatus in soda solution for five minutes. After boiling, lift out the pitcher and fill it with the prescribed solution at 110° F.; a 1 per cent. solution of boric acid is frequently used. Lift the remaining articles into an instrument tray, pour warm sterile water over them, place the tray on the small table, and cover it with a sterile towel.

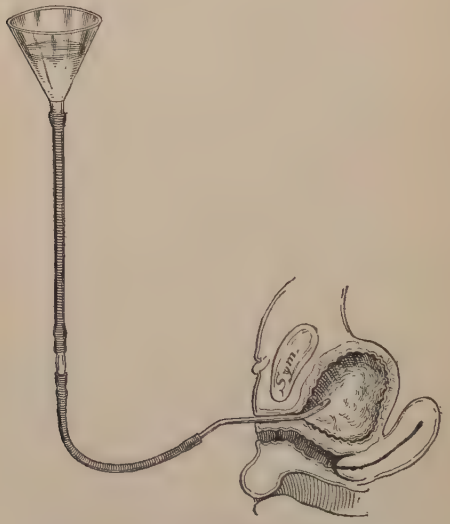

Fig. 57.—Apparatus for bladder washing.

Place the patient in the cross-bed position, with her hips resting upon a Kelly pad. Let the apron of the Kelly pad hang over the edge of the bed into a clean pail. Disinfect your hands and the patient's vulva, spread a sterile towel over the Kelly pad.

Technic.—Take the glass catheter with the rubber tubing attached and catheterize the patient. Then take the glass funnel with the rubber tubing and irrigating nozzle attached, pour the irrigating solution into the funnel until it runs out through the irrigating nozzle, pinch the tubing momentarily, and connect the irrigating nozzle with the tubing on the glass catheter; elevate the funnel about two feet above the level of the bed.

As the solution runs into the bladder pour more into the funnel; continue this until the patient complains of fulness of the bladder; then lower the funnel below the level of the bed and let the fluid run out over the apron of the Kelly pad. When the fluid ceases to run freely, again elevate the funnel and repeat the process until the fluid comes out of the bladder clear.

The two essential features in giving a bladder-wash are: to maintain a consistent asepsis and to prevent the entry of air into the bladder. The latter object is attained by completely filling the funnel, tubing, and irrigating nozzle before connecting it with the catheter, and by keeping the funnel filled with the solution after the connection has been made.

The presence of an assistant, who can pour the solution into the funnel, greatly facilitates and expedites this procedure, but is not absolutely essential.

Cystoscopic Examinations.—*Articles Required.*—*Instruments* (Fig. 58): One pair sponge forceps.
Small Sims speculum.
Conic calibrator.
Hegar urethral dilators, sizes 5 to 10.
Kelly cystoscopes, sizes 7 to 12.
Bladder evacuator.
Ureteral searcher.
Alligator forceps.

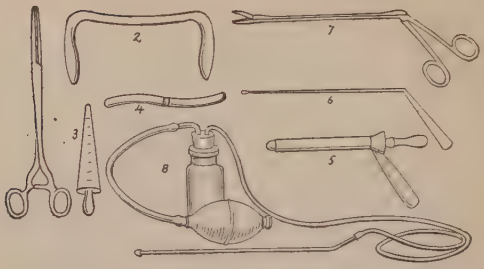

Fig. 58.—Instruments required for a cystoscopic examination: 1, Sponge forceps; 2, small Sims speculum; 3, Conic calibrator; 4, Hegar urethral dilator; 5, Kelly cystoscope; 6, ureteral searcher; 7, alligator forceps; 8, bladder evacuator.

Glassware (Fig. 59): Catheter.
Catheter with six inches of rubber tubing attached.
Glass funnel with four feet of rubber tubing and a glass irrigating point attached.

Fig 59.—Glass and enameled ware articles for a cystoscopic examination: 1, Evacuator; 2, funnel and tubing; 3, medicine-dropper; 4, bowl; 5, pus pan; 6, conic urine glass; 7, small cup.

Two conic urine glasses.
Medicine-dropper with slender tip and with rubber cap tied on.

Enameled ware: Bowl to hold under cystoscope.
Pus pan to receive instruments.
Two small medicine cups.
Three small bowls for the disinfecting outfit.

Supplies: Tube of tiny cotton balls.
Package of square gauze.
Sterile cystoscope sheet.
Package of sterile towels.

Solutions: Boroglycerin.
Protargol, 1 per cent.
Cocain, 10 per cent.
Silver nitrate, 3 per cent.

Equipment.—Cystoscopic examinations are carried out on a low treatment table. Place a table for instruments on the examiner's right and a small table for the disinfecting outfit on the left.

An electric drop-light is the usual form of illumination, the light being reflected through the cystoscope by means of a head-mirror. An electric head-light may be used.

Preparation for Examination.—Place the instruments, enameled ware, and glassware in a large instrument boiler and boil in soda solution for five minutes.

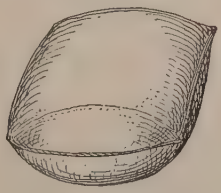

Fig. 60.—Sand-bag.

While these are boiling lay sterile towels on the instrument table; arrange the examining table as for an ordinary gynecologic examination; place a stool and sand-bag (Fig. 60) for the examiner at the foot of the table.

After the apparatus is sterilized, take the sterile

sponge forceps, lift the three small bowls out of the instrument boiler, and arrange them on the small table; pour bichlorid solution 1 : 10,000 into one, sterile water into the second, and green-soap mixture into the third. Open a package of sterile gauze squares and place it upon this table.

Lift the instruments and glassware from the boiler and arrange them on the instrument table in the order of use: first the medicine dropper, then the catheter, the Sims speculum, calibrator, Hegar dilators, according to size, cystoscopes according to size, evacuator, searcher, alligator forceps, catheter with tubing, funnel with tubing and irrigating point.

Place the two conic glasses on this table, one for the drawn specimen of urine, one for the sterile sponge forceps. Place the three small cups here also; pour into the first a dram of a 10 per cent. solution of cocain; into the second, the same quantity of a 3 per cent. silver nitrate solution; and into the third drop a dozen tiny cotton balls.

Place here also the bowl to be held under the cystoscope; the pus pan to receive the instruments; a bottle containing a 1 per cent. solution of protargol, and a wide-mouthed bottle containing boroglycerin. Boil the boroglycerin before and after using; it should be warm when placed on the table.

Preparation of the Patient.—Tell the patient to loosen all her belts and to remove her corset; if the bowels have not moved well an enema should be given; let her void urine just before the examination.

Place the patient on the table in the dorsal position. Disinfect the vulva with boric acid solution, paying particular attention to the vestibule and meatus urinarius.

Catheterize and inject into the urethra a pipetful of a 10 per cent. solution of cocain.

Turn the patient and arrange her in the knee-chest position; push back her clothing and throw over her buttocks and thighs a sterile cystoscopic sheet. These sheets measure a yard wide by one and one-half yards long; the center of each sheet is cut out in the form of an oval opening to expose the vulva.

Place a thickly folded towel on the buttocks, and let an assistant hold the drop-light upon this towel.

Darken the room.

Examination.—The examiner sits upon a stool close to the foot of the table. The nurse stands on the examiner's right.

With sterile sponge forceps pick up each instrument as it is called for, dip it in the warm boroglycerin, and hand it to the examiner. First the Sims speculum, then the calibrator or Hegar dilators, then whichever number of cystoscope is called for.

Hold a bowl under the end of the cystoscope to catch any urine that may escape through it.

After the instruments have been used, receive them in a sterile pus pan, so that they may be used again during the same treatment, if required. After handing the alligator forceps to the examiner pick up, with sterile sponge forceps, several tiny cotton balls in succession; dip them in silver nitrate solution and pass to the examiner.

Finally the examiner calls for the catheter and tubing; pick it up, dip in boroglycerin, and hand to the examiner, who passes it into the urethra and tells the patient to turn over on her side. Place a sterile bowl under the end of the tubing, and, after the air and urine cease to bubble out, take the irrigating apparatus; fill it with a 1 per cent. solution of protargol; connect the irrigating tip with the tubing on the catheter, and let the solution run into the bladder. This solution is retained and acts as a mild antiseptic.

Catheterization of Ureters.—For this procedure prepare the regular cystoscopic outfit, and, in addition, the following articles (Fig. 61):

Ureteral searcher.

Ureteral catheters.

Thumb and forefinger of a large-sized rubber glove.

Sterile test-tubes.

Small glass graduate.

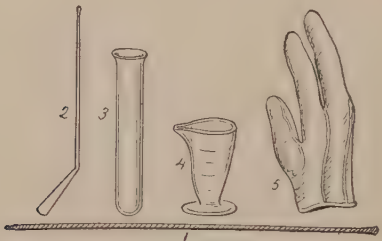

Fig. 61.—Articles required for catheterizing the ureters: 1, Ureteral catheter; 2, ureteral searcher; 3, test-tube; 4, glass graduate; 5, rubber glove fingers.

The *ureteral catheter* is made of a combination of silk and rubber; it should possess a slender tip and a good-sized eye below the tip; sizes 5, 6, and 7 are generally used. Each catheter is provided with a wire stilet and must invariably be wired when not in use; a hollow metal rod forms a convenient receptacle for the catheters.

Prepare the catheters by boiling for two minutes without and two minutes with the stilet. Boil in a long instrument boiler; *never bend or coil the catheter;* lay a towel on the bottom of the boiler to prevent the catheter from sticking to it. See to it that the wire is pushed well into the tip of the catheter, and that it does not project through the eye; after boiling, lift the catheters out upon a sterile towel. After using, inject bichlorid solu-

tion through the catheters and boil before putting them away.

Boil the searcher and conic glass with the cystoscopic instruments. Sterilize the rubber glove-fingers with dry heat and keep them wrapped in a sterile towel ready for use.

Technic.—The patient should drink two glasses of water just before the examination. The usual cystoscopic examination is made first. When the ureteral catheter is called for, grasp the wire projecting from the open end with one pair of sponge forceps and slip a second sponge forceps under the catheter about six or eight inches from its tip.

Never grasp the catheter with the forceps, for by so doing the coating is roughened and the catheter ruined.

Standing to the right of the examiner, advance the catheter until its tip engages in the funnel of the cystoscope. The examiner grasps the catheter with the thumb and forefinger of the right hand and gently pushes it into the ureter. If the examiner's hands are not disinfected, the sterile rubber finger and thumb are slipped on before passing the catheter. As the catheter engages in the ureter the wire stilet is withdrawn gradually until, by the time the tip has reached the pelvis of the kidney, the wire is completely withdrawn.

After the catheter has been passed, the cystoscope is withdrawn; the patient is turned upon her side and the conic glass graduate is held under the open end of the catheter.

Irrigation of the Pelvis of the Kidney.—In the treatment of pyelitis the pelvis of the kidney may be washed out through the ureteral catheter.

In addition to the outfit required for cystoscopy and passing the ureteral catheter the following apparatus is required:

A glass-barreled piston syringe with a two-way

stop-cock and a conic tip which fits into the ureteral catheter.

A one-pint glass graduate filled with sterile normal salt solution colored with methylene-blue.

Thin rubber tubing, ten inches long, to use with the syringe (Fig. 62).

Technic.—After the ureteral catheter has been passed and a sufficient quantity of urine collected from the kidney, the syringe is attached to the ureteral catheter; salt solution is drawn up into

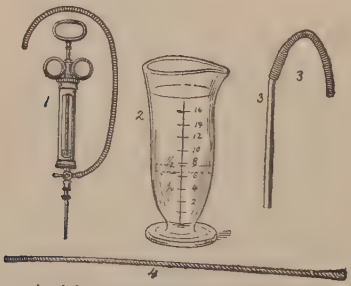

Fig. 62.—Articles required for irrigation of the pelvis of the kidney: 1, Two-way stop-cock syringe with rubber tubing; 2, one-pint graduate; 3, glass catheter and rubber tubing; 4, ureteral catheter.

the barrel through the rubber tubing; the stop-cock is turned and the salt solution injected into the kidney.

A glass catheter with rubber tubing attached is inserted into the bladder alongside the ureteral catheter and the solution, after flushing the pelvis of the kidney, escapes through this into a bowl.

After a pint of salt solution has been used, a solution of bichlorid 1 : 50,000 is drawn up into the syringe, injected into the kidney, and allowed to remain in the bladder. Silver nitrate solution in varying strengths is often used.

Patients under treatment for cystitis or pye-

litis must not lie flat on their backs when they return to bed. They should be encouraged to sit up in bed with the bed-rest, or, if too weak for this, some form of Fowler position must be maintained. This postural treatment tends to prevent ascending infection from the bladder in cases of cystitis and facilitates drainage from the kidney if this organ has already become infected.

THE RECTUM AND ITS DISEASES

ANATOMY OF THE RECTUM

The *rectum* is a cylindric tube which forms the terminal portion of the large intestine. It measures six to eight inches in length, and extends from the sigmoid flexure to the anus. The rectum commences opposite the left sacro-iliac articulation; it curves inward to reach the median line, opposite the third sacral vertebra, and from this point extends downward and forward, following the

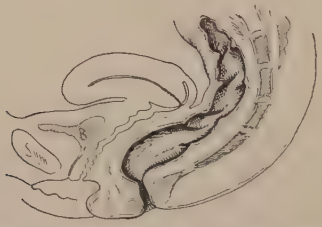

Fig. 63.—Sagittal section showing the direction of the anal canal and rectum proper, also the rectal valves.

curve of the sacrum and coccyx; upon reaching the tip of the coccyx, the rectum bends upon itself and curves downward and backward for one inch and a half to terminate on the skin surface in the anus (Fig. 63).

In order to introduce the finger or an instrument into the rectum, it must be passed from the anus, *in an upward and forward direction*, for about one and one-half inches.

The rectum is in close relation with the vagina,

uterus, and small intestine. It is lined with mucous membrane, possesses a strong muscular coat, and, at its upper part, a peritoneal covering.

The portion of the rectum immediately within the anus is called the *anal canal;* it is narrow and straight, and measures one and one-half inches in length. This opens into a roomy portion, the *ampulla*, which is capable of great distention. The lumen of the upper portion of the rectum is encroached upon by several crescentic folds called Houston's valves, which may offer resistance to the passage of the rectal tube.

The *anus* is an oval orifice situated in the median line, one inch in front of the tip of the coccyx. The anal orifice is guarded by a strong circular muscle, the *external sphincter ani.*

The blood-supply of the rectum and anus is furnished by the hemorrhoidal arteries and veins; the hemorrhoidal nerves connect these organs with the central nervous system.

RECTAL ENEMATA

A rectal injection or enema is a solution thrown into the rectal cavity.

Rectal enemata are classified as cleansing, laxative, nutrient, and stimulating. They may be given low or high in the rectum in amounts varying from several ounces to several quarts.

Apparatus Required for Giving an Enema.—An enameled ware vessel for the solution.

An enameled ware funnel.

A soft-rubber rectal tube No. 21 American scale for low enemata (Fig. 64); No. 12 American scale for high enemata.

Boil the funnel and tube in a basin for five minutes before and after using.

Method of Giving a Low Enema.—If the patient is dressed, tell her to remove her corset and loosen all bands around the waist.

Place her in the Sims position on a bed or couch;

draw her clothing out of the way; cover her with a sheet, and place a pad under her hips for protection. The Sims position is used because, in this position, the small intestines are carried out of the pelvis and the rectal canal is somewhat straightened.

Mix the solution for the enema in the enameled ware pitcher. Connect the funnel and rectal

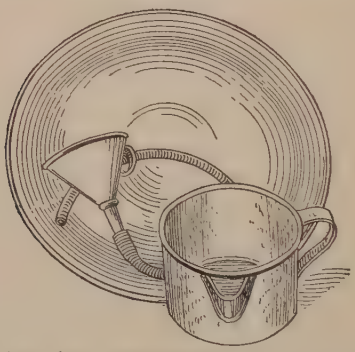

Fig. 64.—Outfit for giving low enema.

tube, and pour the solution through them until all air is expelled. Pinch the tube and anoint its free end liberally with vaselin. Hold the tube in your right hand, lift the patient's buttock with your left hand, to expose the anal orifice. Tell the patient to bear down,—this will relax the anal sphincter,—and insert the tube carefully, pushing it upward and forward, *i. e.*, toward the vagina, until four inches have passed within the bowel.

A well-greased rectal tube inserted in the proper direction will seem to slip in of itself. If any obstruction is encountered, or if the patient complains of pain, the tube is not properly inserted; you must withdraw it and begin again.

External hemorrhoids may confuse a beginner; when these are present, the anal orifice will be found in the center of the protruding mass. If in doubt, it is wise to introduce a well-oiled and gloved finger into the rectum to determine the direction of the anal canal.

After the tube is inserted release the pressure from it; elevate the funnel about 12 inches above the level of the bed, and let the solution flow into the rectum. Keep the funnel filled with the solution (Fig. 65).

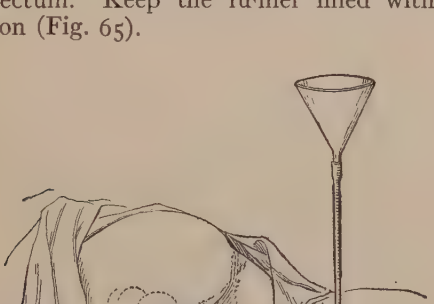

Fig. 65.—Method of giving an enema. Patient in the Sims position, rectal tube inserted, connected with a funnel and tubing.

The quantity of fluid which can be given varies. As a rule, the patient soon complains of fulness of the rectum, but by slowing or temporarily arresting the flow, the rectum becomes more tolerant and a larger quantity can usually be injected than at first seems possible. When the prescribed quantity has been injected or sooner, if the patient's limit has been reached, arrest the flow by pinching the tube, withdraw the tube, and direct the patient to hold the solution as long as possible.

After receiving an enema, the patient may require the bed-pan immediately, but, if possible, should retain the solution five or ten minutes. Never use force in inserting the tube or in injecting the solution; neglect of this rule may result in serious injury to the patient.

Method of Giving a High Enema.—Arrange the patient in the Sims position as for a low enema. Insert the well-anointed rectal tube gently in the direction of the anal canal, telling the patient to bear down as usual. After two or three inches of the tube have passed, it will be felt to change

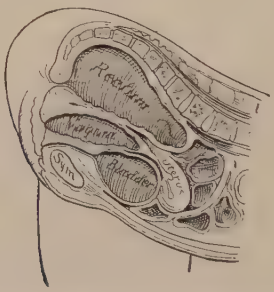

Fig. 66.—Patient in knee-chest position.

in direction, following the course of the rectum proper. After inserting a few more inches you may feel some resistance to its further passage as the tube strikes the lowest rectal valve. When this occurs, withdraw the tube for about one inch and then advance it again gently, giving the tube a slightly twisting direction. If the obstruction still does not yield, a little fluid run through the tube may suffice to carry the valve out of the way. A second and a third slight obstruction may be encountered and must be overcome in the same manner as the first. Pass eight or ten inches of the tube within the anal orifice.

If a pelvic tumor is present, pressing upon the rectum, it may be impossible to pass the rectal tube above the tumor with the patient in the Sims position. Under these conditions it may be necessary to place the patient in the knee-chest position (Fig 66), which tends to carry the tumor out of the pelvis and balloons the rectum with air, which makes the passage of the tube an easy matter.

Solutions Used for Enemata.—*Cleansing Enemata.*—Salt solution or soap and water. Give at 100° to 105° F.

The stock soap mixture used for enemata is made by boiling small pieces of Castile soap in water until a jelly is formed. This mixture is kept tightly corked in a wide-mouthed bottle; one or two tablespoonfuls added to a quart of water makes a solution of the proper consistence.

Laxative Enemata.—Salt solution; or soap and water (one pint), glycerin (one ounce), olive oil (four ounces), or the following formulæ:

Turpentine	2 drams;
Glycerin	4 ounces;
Salt solution	2 quarts.
Castor oil, Magnesium sulphate, of each	½ ounce;
Turpentine	2 drams;
Glycerin	4 ounces;
Hot water	1 pint.

Give at 100° to 105° F.

Nutrient Enemata.—Formula 1: Table-salt, 15 grains; one raw egg; beef-juice, two ounces, and peptonized milk, two ounces.

2. One raw egg; peptonized milk, three ounces.

3. Beef-juice, two ounces, and liquor pancreaticus, two ounces.

Give a cleansing enema of salt solution before the first nutrient enema, and repeat before every third feeding.

Inject the nutrient enema high, at a temperature of 100° F.; give four to six ounces at a time, and

repeat in six hours. Add a small quantity of pepsin or pancreatin to each enema, to aid assimilation; if the rectum becomes irritable, add also five or ten drops of tincture of opium. The patient must lie still for one hour after each enema.

Stimulating Enemata.—Black coffee, eight ounces, or the following formula:

Ammonium carbonate.....	30 grains
Whisky.....	1 ounce
Salt solution.....	1 quart.

Give at 105° F.; inject high and hold a pad against the rectum after giving the enema. If the sphincter is relaxed, elevate the foot of the bed.

RECTAL IRRIGATION

Rectal irrigation is a valuable method of treating certain diseases of the rectum.

The apparatus required consists of a funnel, rubber tubing, and rectal irrigator; the latter is a two-way tube of glass (Fig. 67) or metal, one

Fig. 67.—Glass rectal irrigator.

branch of which is attached to the funnel and tubing; the other branch is free.

Method of Irrigating the Rectum.—Arrange the patient in the Sims position, as for an enema.

Connect the funnel, tubing, and irrigating nozzle; pour the prescribed solution into the funnel until it runs out through the irrigator; pinch the tubing and insert the irrigator in the rectum as you would a rectal tube; release the tubing and continue to

pour the solution into the funnel. After distending the rectum the solution will run out through the free branch of the irrigator; continue flushing until it runs out clear.

If it is desired to leave some solution in the rectum, stop the free end of the irrigator and withdraw it carefully while the funnel is full.

Colonic Irrigation.—This procedure is carried out in the same manner as rectal irrigation through a colon tube and funnel, by alternately raising and lowering the funnel.

The patient should be in the Sims or knee-chest position.

EXAMINATION OF THE RECTUM

The rectum is examined by palpation and inspection.

Preparation of the Patient.—Direct the patient to loosen all belts and remove her corset.

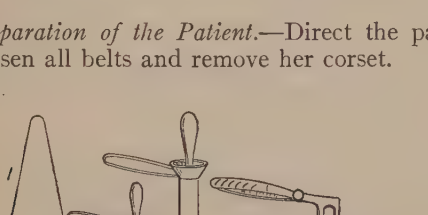

Fig. 68.—Instruments for proctoscopic examination: 1, Conic rectal dilator; 2, proctoscope; 3, colonoscope; 4, fenestrated rectal speculum; 5, long alligator forceps.

Give a high enema of soap and water or salt solution one or two hours before the examination.

Arrange the patient on the examining table in the lithotomy, Sims, or knee-chest position.

Prepare for the physician a nail-brush, soap and

water, bichlorid solution, sterile rubber gloves, and vaselin as a lubricant.

Instruments required (Fig. 68):

Conic rectal dilator.

Proctoscope.

Colonoscope.

Fenestrated rectal speculum.

Long alligator forceps.

If the electric proctoscope or reflected light is used, darken the room after the patient is in position.

DISEASES OF THE RECTUM

Proctitis.—*Proctitis* is an inflammation of the rectum. The inflammation may be catarrhal, suppurative, or membranous.

The *causes* of proctitis are mechanical or chemical irritation and infection.

The *symptoms* are weight and fulness in the rectum; constant straining and the frequent discharge of mucus, blood, or pus; at first, constipation; later, diarrhea.

The *local treatment* of proctitis consists in rectal irrigation and the application of medicated solutions by injection or through the proctoscope.

Hemorrhoids or Piles.—The word hemorrhoid is derived from a Greek word meaning "flowing with blood." Pile is derived from a Greek word meaning a ball or globe.

Hemorrhoids or piles are varicose tumors of the lower rectum, characterized by a tendency to bleed and protrude (after Gant).

Hemorrhoids are classed as external or internal, according to whether they protrude through the anus or not. Each pile consists of a group of dilated veins covered with mucous membrane.

The *causes* of hemorrhoids are constipation, the erect posture, and the absence of valves from the rectal veins.

The *symptoms* of hemorrhoids are bleeding, protrusion, rectal tenesmus, and constipation.

The *curative treatment* is surgical, and consists in removal of the tumors by the clamp and cautery or by excision.

Prolapse of the Rectum.—Prolapse of the rectum is a downward displacement of some portion of the rectum through the anal orifice.

The *causes* of prolapse of the rectum are fecal impaction, proctitis, diarrhea, and whooping-cough.

The *symptoms* comprise the protrusion, through the anus, of a dark-red, soft mass, which can be replaced; a sense of weight and fulness in the rectum, straining, and a more or less irritating discharge.

The *treatment* is surgical.

Anal Fissure.—An anal fissure or painful ulcer of the rectum is a superficial, slit-like ulcer, situated at the junction of the rectal mucous membrane and the skin.

The *symptoms* of anal fissure are severe rectal pain, rectal tenesmus, and constipation.

The *causes* are constipation or injury while inserting a suppository or rectal nozzle.

The *treatment* consists in regulating the bowels, stretching the anal sphincter, incision or excision of the ulcer.

Stricture of the Rectum.—Stricture of the rectum is a narrowing of its lumen.

The *causes* are syphilitic, tubercular, or malignant ulceration of the rectum, with cicatrization.

The *symptoms* are constipation, which may be absolute or may alternate with diarrhea from ulceration, pain, discharge of pus and blood, emaciation, and irregular fever.

The *treatment* of simple stricture consists in gradual dilatation by bougies; malignant stricture is treated by wide excision of the rectum or by the

formation of an artificial anus through tne operation of colostomy.

Ischiorectal Abscess.—An ischiorectal abscess is an abscess situated in the ischiorectal fossa or space between the rectum and the tuberosity of the ischium on each side.

The *causes* of ischiorectai abscesses are falls, injury by syringe nozzles, ulceration and stricture of the rectum, suppuration of the pelvic organs, glands, and bones.

Symptoms.—The onset may be acute, with a chill, followed by a rise of temperature, rapid pulse, coated tongue, and headache.

The local symptoms are pain and tenderness, heat and throbbing in the rectum, increased by defecation.

The affected side is swollen and tender; the overlying skin appears red and shining.

The *treatment* is surgical, and consists in free incision, irrigation, cauterization, and gauze drainage.

Anal Fistula.—An anal fistula is an unhealthy, tube-like passage between the rectum and the surface of the body near the anus. Anal fistulæ are always secondary to perirectal abscess.

Symptoms.—The presence of an opening near the anus from which pus, blood, and fecal matter is discharged. Localized pain and tenderness.

The *treatment* is surgical, and consists in free division or excision of the fistula.

Cancer of the Rectum.—About 4 per cent. of all cancers occur in the rectum.

The cause of cancer of the rectum is not known.

Early in the course of the disease the bowel is thickened, and a stricture may be formed by the projection of nodular masses into its lumen; later ulceration occurs.

The *symptoms* are weight and fulness in the rectum; frequent desire to stool; alternate constipation

and diarrhea; the passage of mucus, pus, and blood; in some cases, severe pain.

The *treatment* is surgical, and consists in wide excision of the rectum or in colostomy with the formation of an artificial anus.

RECTAL OPERATIONS

Preparation for Rectal Operations.—Twenty-four hours before operation give the patient a low enema of two quarts of soap-suds. Six hours before operation give a high enema of salt solution—one quart. Four hours before operation irrigate the rectum with permanganate solution 1 : 2000, until the solution comes away clear.

Anesthetic.—The shorter rectal operations may be performed under cocain or nitrous oxid anesthesia, but, as a rule, general anesthesia by ether is used.

Preparation on the Table.—After the patient is anesthetized, place her on the operating table in the lithotomy position, with her hips resting on a Kelly pad.

Expose the perineum and draw on the leglettes as for a minor gynecologic operation. Wash the perineum with soap and water and disinfect with bichlorid solution.

Operation for Anal Fistula.—*Steps in the Operation.*—The sphincter is dilated with a conic dilator, and the rectal mucous membrane is inspected for the internal orifice of the fistula; when this is found, a fistula probe is passed along the fistulous tract from the external to the internal opening, a bullet-tipped grooved director is passed along the course of the probe, and brought out through the anal orifice.

The tissues overlying the grooved director are cut through with a stout knife, the fistulous tract is cureted or excised, and the wound is packed with gauze.

Instruments required (Fig. 69):
Conic rectal dilator.
Fistula probe.
Bullet-pointed grooved director.
Knife.
Hemostats.
Curet.
Rat-toothed forceps
One pair straight, sharp-pointed scissors.
One pair curved, sharp-pointed scissors.
Catgut No. 1 for tying vessels.
Irrigating can, tubing, and nozzle.

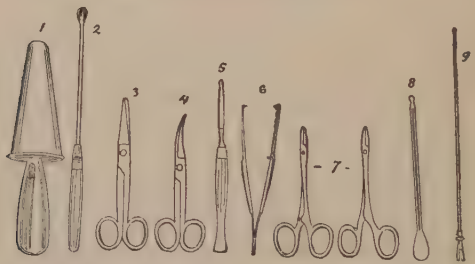

Fig. 69.—Instruments required for excision of an anal fistula: 1, Conic rectal dilator; 2, spoon curet; 3, 4, scissors; 5, knife; 6, rat-toothed forceps; 7, hemostats; 8, bullet-pointed grooved director; 9, fistula probe.

Dressings.—Apply a thick pad of sterile gauze over the packing and hold in place by a T-bandage.

After-care.—Catheterize every eight hours if required. Change the outer dressings when soiled. The packing is removed after twenty-four hours, when the wound is irrigated and repacked.

Diet.—Liquid and semiliquid for the first week, full tray after the seventh day.

Bowels.—Give a half-ounce of castor oil on the fifth day, follow by a soap-suds enema.

The Clamp and Cautery Operation for Hemorrhoids.—*Steps in the Operation.*—The

sphincter is dilated and the hemorrhoids exposed; a single hemorrhoid is grasped by pile forceps and the junction of skin and mucous membrane at its base is incised, the clamp is adjusted and screwed tight, the pile is cut off with scissors, and its base seared with the Paquelin cautery; the clamp is removed, bleeding vessels tied, if necessary, and the stump is dropped back into the rectum.

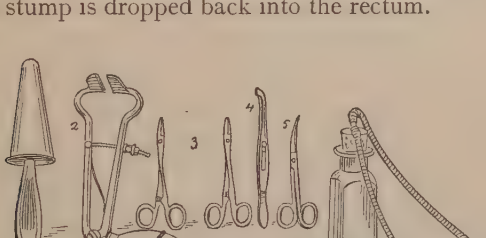

Fig. 70.—Instruments required for the clamp and cautery operation for hemorrhoids: 1, Conic rectal dilator; 2, pile clamp; 3, hemostats; 4, pile forceps; 5, curved scissors; 6, Paquelin cautery.

Instruments required (Fig. 70):
Conic rectal dilator.
Pile forceps.
Curved, sharp-pointed scissors.
Pile clamp.
Paquelin cautery.
Hemostats.
Catgut No. 1.

Dressings.—Press a wedge-shaped compress of sterile gauze against the anus and hold in place by a T-bandage.

After-care.—The pain during the first thirty-six hours is relieved by morphin.

Give alternate feedings of beef-juice and albumen-water for five days; soft diet for the next two days.

Give a laxative, *e. g.*, four ounces of Hunyadi water, on the fourth day after operation, and a soap-suds enema when there is desire for a movement. Repeat this daily for four days.

Bathe the anus with very hot water every morning and evening.

Keep the patient in bed one week.

Ischiorectal Abscess.—*Description of Operation.*—Under general anesthesia the fluctuating mass is freely incised, its cavity cureted, irrigated, and tightly packed.

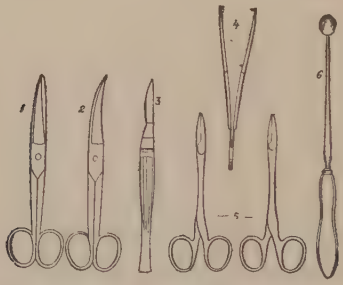

Fig. 71.—Instruments required for the evacuation of an ischiorectal abscess: 1, straight scissors; 2, curved scissors; 3, knife; 4, anatomic forceps; 5, hemostats; 6, spoon curet.

Instruments required (Fig. 71):

Knife.
Hemostats.
Spoon curet.
Anatomic forceps.
Straight, sharp-pointed scissors.
Irrigating can, tubing, and nozzle.

Dressings.—Apply a thick pad of sterile gauze and a T-bandage.

After-care.—This is the same as after the operation for anal fistula.

Secondary hemorrhage may follow any rectal

operation; as a rule, the loss of blood is sudden and profuse, occurring on the fifth to eighth day after the operation.

The symptoms are those of internal hemorrhage, pallor, restlessness, feeble frequent pulse, and subnormal temperature. There may be rectal tenesmus and, rarely, the evacuation of thin blood.

The occurrence of such symptoms at any time after a rectal operation must be reported to the surgeon at once.

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